Mendota Pool Bypass and Reach 2B Improvements Project

Draft
Environmental Impact Statement/Report

SAN JOAQUIN RIVER
RESTORATION PROGRAM

State Clearinghouse No. 2009072044

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List of Abbreviations and Acronyms

°C	degree Centigrade
°F	degree Fahrenheit
µg/L	microgram per liter
µg/m^3	micrograms per cubic meter
µS/cm	microsiemens per centimeter
4,4'-DDD	dichlorodiphenyldichloroethane
4,4'-DDE	dichlorodiphenyldichloroethylene
AAQS	Ambient Air Quality Standards
AB	Assembly Bill
ACHP	Advisory Council on Historic Preservation
Act	San Joaquin River Restoration Settlement Act
ADRP	Archaeological Data Recovery Program
ADT	average daily traffic
AIA	Air Impact Assessment
alpha-HCH	alpha-hexachlorocyclohexane
APE	Area of Potential Effect
ARB	California Air Resources Board
B.P.	Before Present
BACT	Best Available Control Technology
Basin Plan	Water Quality Control Plan for the Sacramento and San Joaquin River Basins
BMP	Best Management Practice
CAA	Federal Clean Air Act
CAAA	Federal Clean Air Act Amendments of 1990
CAAQS	California Ambient Air Quality Standards
CAL FIRE	California Department of Forestry and Fire Protection
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Occupational and Health Administration
CAL-IPC	California Invasive Plant Council
CalRecycle	California Department of Resources, Recycling, and Recovery
Caltrans	California Department of Transportation
CCAA	California Clean Air Act
CCID	Central California Irrigation District
CDF	California Department of Finance
CDFA	California Department of Food and Agriculture
CEC	California Energy Commission
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act

CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHP	California Highway Patrol
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPPA	California Native Plant Protection Act
CNPS	California Native Plant Society
CNRA	California Natural Resources Agency
CO	Carbon monoxide
CO2e	Carbon dioxide equivalent
Corps	U.S. Army Corps of Engineers
Court	U.S. Eastern District Court of California
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CSLC	California State Lands Commission
CT	Census Tract
CTR	California Toxics Rule
CVFED	Central Valley Floodplain Evaluation and Delineation
CVFPB	Central Valley Flood Protection Board
CVHM	Central Valley Hydrologic Model
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
dB	decibels
dBA	A-weighted decibels
DDT	dichlorodiphenyltrichloroethane
Delta	Sacramento-San Joaquin Delta
DFW	California Department of Fish and Wildlife
DHS	California Department of Health Services
DMC	Delta-Mendota Canal
DOC	California Department of Conservation
DOE	California Department of Water Resources, Division of Engineering
DOGGR	California Department of Conservation Division of Oil, Gas, and Geothermal Resources
DOT	U.S. Department of Transportation
DPR	California Department of Pesticide Regulation
DSOD	California Department of Water Resources, Division of Safety of Dams
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
EA	Environmental Assessment
EC	electrical conductivity

EDD	California Employment Development Department
EFH	essential fish habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EIS/R	Environmental Impact Statement/Environmental Impact Report
EMFAC	Emission Factors Modeling Software
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Federal Endangered Species Act
ESU	Evolutionarily Significant Unit
Exchange Contractors	San Joaquin River Exchange Contractors
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
Flood Control Project	Lower San Joaquin River Flood Control Project
Flood Operation Manual	Flood Control Project's Operation and Maintenance Manual for Levee, Irrigation and Drainage Structures, Channels and Miscellaneous Facilities
FMMP	California Farmland Mapping and Monitoring Program
FONSI	Finding of No Significant Impact
fps	feet per second
FR	Federal Register
Fresno COG	Fresno County of Government
FTA	Federal Transit Administration
FWA	Friant Water Authority
FWCA	Fish and Wildlife Coordination Act
FY	Fiscal Year
g	acceleration due to Earth's gravity
GAMAQI	Guide for Assessing and Mitigating Air Quality Impacts
GCM	Global Climate Model
GHG	greenhouse gas
GIS	Geographic Information System
GWP	Global Warming Potential
HAP	Hazardous Air Pollutant
HEC-RAS	Hydrologic Engineering Center River Analysis System
HSG	Hydrologic Soils Group
IMPLAN	Impact Analysis for Planning
I-O	input-output
IEPR	Integrated Energy Policy Report
in/year	inches per year
IPCC	Intergovernmental Panel on Climate Change

IS	Initial Study
ISMP	Invasive Species Management Plan
ISR	Indirect Source Review
Ldn	Day-Night Noise Level
Leq	Equivalent Noise Level
LESA	Land Evaluation and Site Assessment
Levee District	Lower San Joaquin Levee District
Lmax	Maximum Noise Level
LN	The sound level exceeded N percent of the time
LOS	Levels of Service
LSJLD	Lower San Joaquin Levee District
MBTA	Migratory Bird Treaty Act
mg/L	milligram per liter
mm/year	millimeters per year
MMRP	Mitigation Monitoring and Reporting Program
MND	Mitigated Negative Declaration
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mph	miles per hour
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
N2O	Nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAL	Numeric Action Limit
NEPA	National Environmental Policy Act
NGO	Non-governmental organization
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO	Nitric oxide
NO2	Nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOD	Notice of Determination
NOE	Notice of Exemption
NOI	Notice of Intent
NOP	Notice of Preparation
NOx	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRDC	Natural Resources Defense Council
NRHP	National Register of Historic Places
NTU	nephelometric turbidity unit
NWP	Nationwide Permit

OEHHA	California Office of Environmental Health Hazard Assessment
OES	Office of Emergency Services
OHV	off-highway vehicle
OHWM	ordinary high water mark
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PCB	polychlorinated biphenyl
PEIS/R	Program Environmental Impact Statement/ Environmental Impact Report
PG&E	Pacific Gas and Electric Company
PM10	particulate matter with an aerodynamic resistance diameter of 10 micrometers or less
PM2.5	Fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less
Pool	Mendota Pool
ppb	parts per billion
ppm	parts per million
PRD	Permit Registration Documents
Project	Mendota Pool Bypass and Reach 2B Improvements Project
RA	Restoration Administrator
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
Restoration Area	the San Joaquin River Restoration area from Friant Dam to the Merced River confluence
RHA	Rivers and Harbors Act
RHJV	Riparian Habitat Joint Venture
RM	river mile
RoadMod	Roadway Construction Emissions Model
ROD	Record of Decision
ROG	Reactive Organic Gases
RTP	Regional Transportation Plan
RWA	Recovered Water Account
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
Secretary	Secretary of the U.S. Department of the Interior
Settlement	Stipulation of Settlement
SFEI	San Francisco Estuary Institute
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SJRRP	San Joaquin River Restoration Program
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SJVDP	San Joaquin Valley Drainage Program

SMARA	California Surface Mining and Reclamation Act
SO2	Sulfur dioxide
SR	State Route
SRH-1DV	Sedimentation and River Hydraulics One Dimensional Vegetation Model
State	State of California
SVP	Society of Vertebrate Paleontology
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
T-BACT	Best Available Control Technology for toxic air contaminants
TAC	Technical Advisory Committee
TAF	thousand acre-feet
TDS	Total Dissolved Solids
Tg	teragram
TM	Technical Memorandum
TMDL	Total Maximum Daily Load
UCMP	University of California Museum of Paleontology
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VdB	vibration decibels
VMC	Visual Modification Class
VP	Viewing Position
WHR	California Wildlife Habitat Relationship System
WNV	West Nile Virus

SAN JOAQUIN RIVER RESTORATION PROGRAM

Draft

Mendota Pool Bypass and Reach 2B Improvements Project Environmental Impact Statement/ Environmental Impact Report

SCH # 2009072044

June 2015

The San Joaquin River Restoration Program is a comprehensive long-term effort to restore flows to the San Joaquin River from Friant Dam to the confluence of Merced River and restore a self-sustaining Chinook salmon fishery in the river while reducing or avoiding adverse water supply impacts from Interim and Restoration flows.

Mission Statements

The mission of the Bureau of Reclamation is to manage, develop and protect water and related resources in an environmentally and economically sound manner in the interest of the American Public.

CALIFORNIA STATE LANDS COMMISSION

The California State Lands Commission serves the people of California by providing stewardship of the lands, waterways, and resources entrusted to its care through economic development, protection, preservation, and restoration.

Executive Summary

Introduction and Background

Mendota Pool

The Mendota Pool Bypass and Reach 2B Improvements Project (Project) includes the construction, operation, and maintenance of the Mendota Pool Bypass and improvements in the San Joaquin River channel in Reach 2B (Figure S-1). The Project consists of a floodplain width that conveys at least 4,500 cubic feet per second (cfs), a method to bypass Restoration Flows around Mendota Pool, and a method to deliver water to Mendota Pool. The Project footprint and vicinity (Figure S-2) extend from approximately 0.3 mile above the Chowchilla Bifurcation Structure to approximately 1.0 mile below the Mendota Dam. The Project footprint comprises the area that could be directly affected by the Project. The Project study area or "Project area" includes areas directly and indirectly affected by the Project. The Project area is in Fresno and Madera counties, near the town of Mendota, California.

The Mendota Pool Bypass and Reach 2B improvements, defined in the Stipulation of Settlement in *Natural Resources Defense Council, et al., v. Kirk Rodgers, et al.* (Settlement), are (Settlement Paragraph 11[a]):

> *(1) Creation of a bypass channel around Mendota Pool to ensure conveyance of at least 4,500 cfs from Reach 2B downstream to Reach 3. This improvement requires construction of a structure capable of directing flow down the bypass and allowing the Secretary [of the Interior] to make deliveries of San Joaquin River water into Mendota Pool when necessary;*
>
> *(2) Modifications in channel capacity (incorporating new floodplain and related riparian habitat) to ensure conveyance of at least 4,500 cfs in Reach 2B between the Chowchilla Bifurcation Structure and the new Mendota Pool bypass channel.*

Because the functions of these channels may be inter-related, the design, environmental compliance, and construction of the two are being addressed as one project. The Project would be implemented consistent with the Settlement and the San Joaquin River Restoration Settlement Act (Act), with implementation dates clarified by the Draft Framework for Implementation (San Joaquin River Restoration Program [SJRRP] 2015).

Mendota Dam

Figure S-1. Overview of the SJRRP Restoration Area and the Project Vicinity

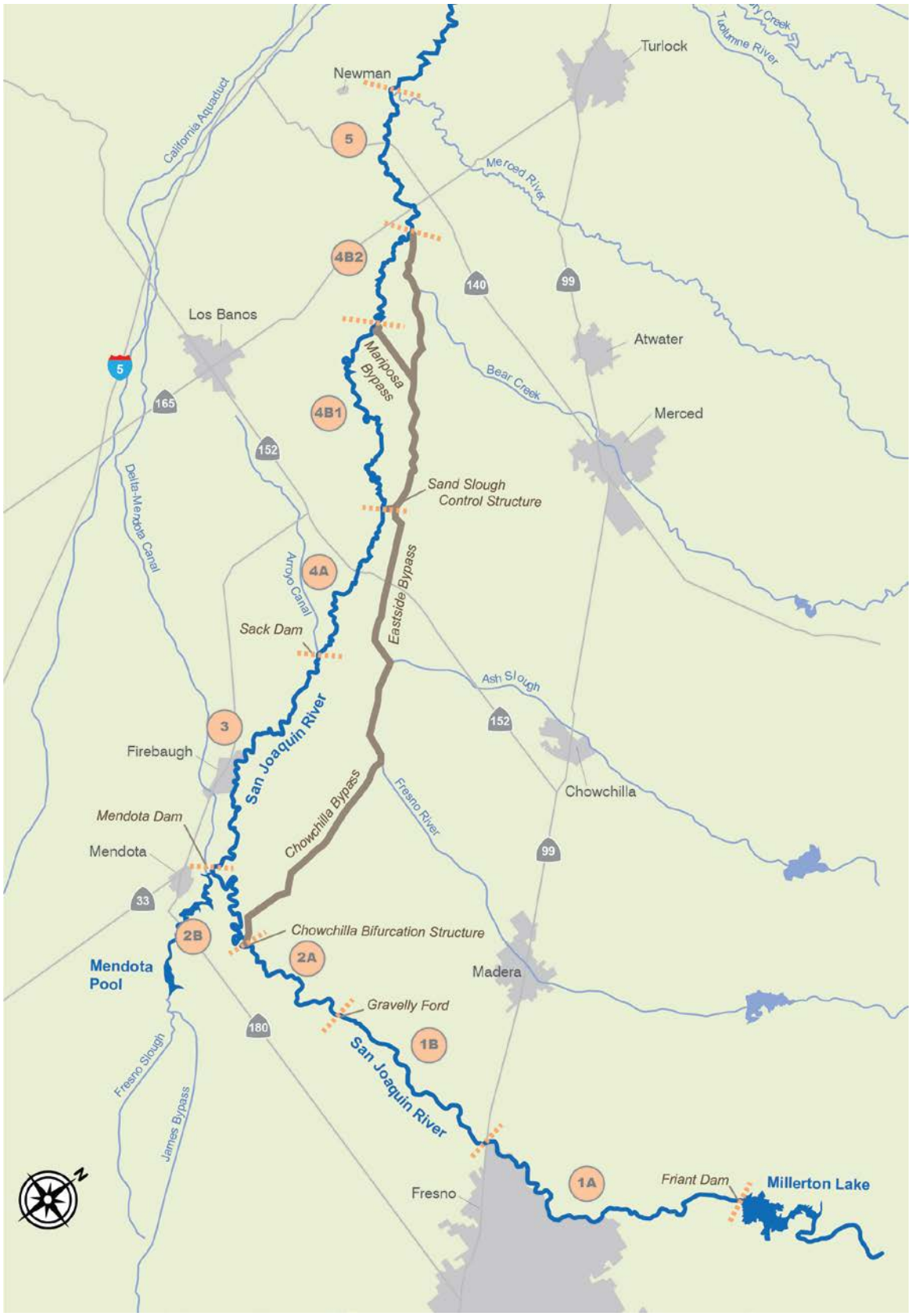
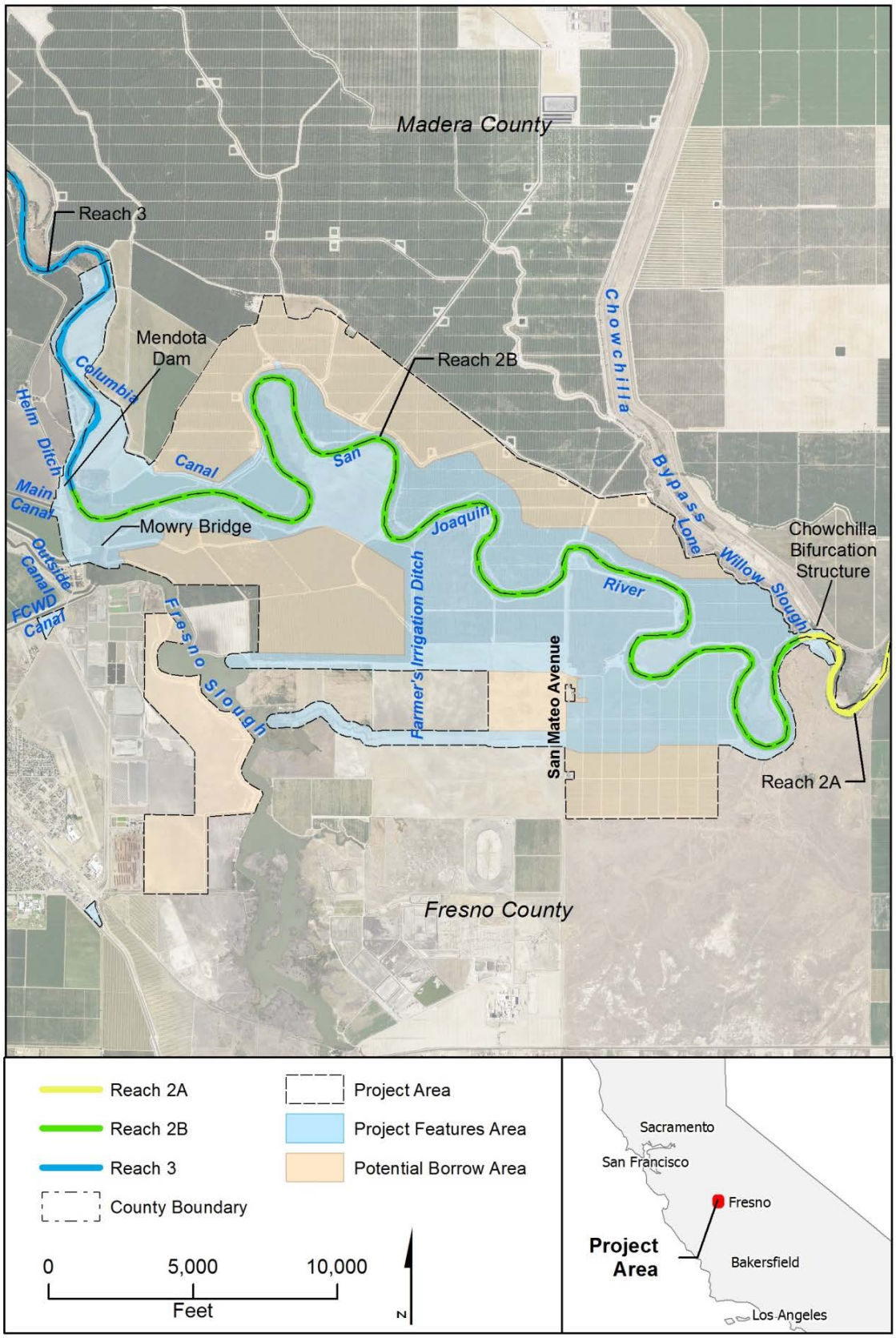


Figure S-2. Project Footprint and Vicinity



The Mendota Pool Bypass would include conveyance of at least 4,500 cfs around Mendota Pool (or the Pool) from Reach 2B to Reach 3 and a fish barrier, if appropriate, to direct upmigrating adult salmon into the bypass. The bypass could be accomplished by constructing a new channel around Mendota Pool or by limiting Mendota Pool to areas outside of the San Joaquin River. This action would include the ability to divert 2,500 cfs to the Pool if water deliveries are required for the San Joaquin River Exchange Contractors (Exchange Contractors) and may consist of a bifurcation structure in Reach 2B. The bifurcation structure would include a fish passage facility to enable up-migrating salmon to pass the structure and a fish screen, if appropriate, to direct out-migrating fish into the bypass channel and minimize or avoid fish entrainment to the Pool.

Headworks of the Main Canal

Improvements to Reach 2B would include modifications to the San Joaquin River channel from the Chowchilla Bifurcation Structure to the new Mendota Pool Bypass to provide a capacity of at least 4,500 cfs with integrated floodplain habitat. The options under consideration include potential levee setbacks along Reach 2B to increase the channel and floodplain capacity and provide for floodplain habitat. Floodplain habitat is included along the Reach 2B portion of the Project as required by the Settlement; floodplain habitat is being considered along the Mendota Pool Bypass channel because Central Valley floodplains have been shown to be of value to rearing juvenile salmon as they migrate downstream. In addition, the SJRRP Fisheries Management Plan (SJRRP 2010a) and Minimum Floodplain Habitat Area for Spring and Fall-Run Chinook Salmon report (SJRRP 2012) describe that sufficient floodplain habitat is an important feature for meeting salmon population targets.

This Executive Summary provides an overview of the Environmental Impact Statement/Environmental Impact Report (EIS/R) prepared pursuant to the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). This EIS/R evaluates alternative ways to implement Paragraphs 11(a)(1) and 11(a)(2) of the Settlement, consistent with the Act in Public Law 111-11. U.S. Department of the Interior, Bureau of Reclamation (Reclamation) is the lead NEPA agency and California State Lands Commission (CSLC) is the lead CEQA agency in preparing this EIS/R.

Chowchilla Bifurcation Structure

Stipulation of Settlement

In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC), filed a lawsuit, known as *NRDC, et al., v. Kirk Rodgers, et al.*, challenging the renewal of long-term water service contracts between the United States and Central Valley Project (CVP) Friant Division contractors. On September 13, 2006, after more than 18 years of litigation, the Settling Parties, including NRDC, Friant Water Authority (FWA), and the U.S. Departments of the Interior and Commerce, agreed on the terms and conditions of a Settlement subsequently approved by the U.S. Eastern District Court of California on October 23, 2006. The Act, included in Public Law 111-11 and signed into law on March 30, 2009, authorizes and directs the Secretary of the Interior (Secretary) to implement the Settlement. The Settlement establishes two primary goals:

- **Restoration Goal** – To restore and maintain fish populations in "good condition" in the main stem San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.
- **Water Management Goal** – To reduce or avoid adverse water supply impacts on all of the Friant Division long-term contractors that may result from the Interim and Restoration flows provided for in the Settlement.

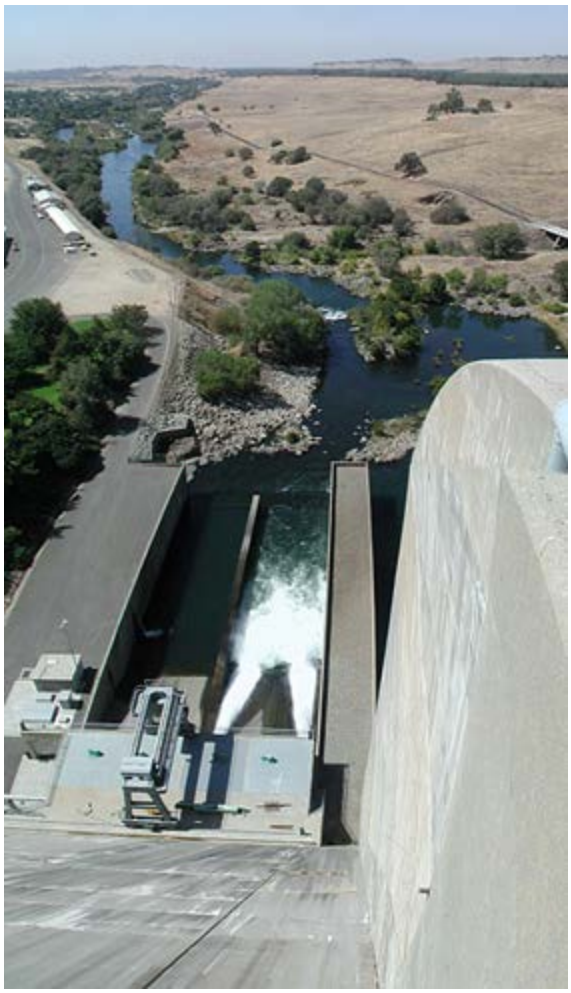
Chinook salmon

To achieve the Restoration Goal, the Settlement calls for releases of water from Friant Dam to the confluence of the Merced River (referred to as Interim and Restoration flows), a combination of channel and structural modifications along the San Joaquin River below Friant Dam, and reintroduction of Chinook salmon. Restoration Flows are specific volumes of water to be released from Friant Dam during different water year types, according to Exhibit B of the Settlement. Interim Flows are experimental flows that began in 2009 and ended December 2013 with the purpose of collecting relevant data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture, and reuse. Restoration Flows began January 1, 2014.

Orange groves within the Friant Division of the Central Valley Project

San Joaquin River Restoration Program

The SJRRP comprises several Federal and State of California (State) agencies responsible for implementing the Settlement. Implementing Agencies include Reclamation, U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), California Department of Water Resources (DWR), and California Department of Fish and Wildlife (DFW). In addition, the Settlement stipulates that a Technical Advisory Committee be established, comprising six members appointed by NRDC and FWA. The Settlement also calls for a Restoration Administrator (RA) to provide specific recommendations to the Secretary in coordination with the Technical Advisory Committee. The RA is responsible for consulting with the Secretary on implementing actions under Paragraph 11 of the Settlement, and for identifying and recommending additional actions under Paragraph 12 of the Settlement. In addition, the RA is responsible for consulting with the Secretary on the reintroduction of Chinook salmon under Paragraph 14 of the Settlement and flow releases under Paragraphs 13 and 15.



Releases from Friant Dam

Purpose and Uses of this Project EIS/R

The purpose of this EIS/R is to analyze the project-specific direct, indirect, and short term/long term impacts of implementing the Project as directed by the Act, consistent with NEPA/CEQA requirements. This EIS/R serves as an informational document for decision makers, public agencies, non-government organizations, and the general public regarding the potential direct and indirect environmental consequences of implementing any of the alternatives. This EIS/R supports the needed permits, petitions, and similar compliance, coordination, and consultation efforts for the Project actions.

As previously described, Reclamation is the lead NEPA agency and CSLC is the lead CEQA agency in preparing this EIS/R. The actions identified in this EIS/R include actions to be undertaken by Reclamation, as approved by CSLC. No sooner than 30 days after the final EIS/R is published, Reclamation will prepare a Record of Decision. Similarly, CSLC will take actions on whether to certify the EIR, approve the Project, and file a Notice of Determination.

The Settlement identifies the Secretary as the lead Federal entity responsible for implementation and USFWS as the lead Federal agency responsible for reintroduction of spring-run and fall-run Chinook salmon. The Secretary has designated Reclamation to act as the lead Federal entity responsible for implementation of the Settlement. The Settlement also identifies the Secretary of the U.S. Department of Commerce, through NMFS, as a necessary participant to allow for permitting the reintroduction of spring-run Chinook salmon. The Settlement also anticipated involvement of the California Natural Resources Agency through DWR and DFW. Therefore, the Settlement Implementing Agencies are Reclamation, USFWS, NMFS, DWR, and DFW.

Reclamation and CSLC have coordinated with the Settling Parties and Implementing Agencies in preparation of this EIS/R. In addition, several agencies accepted the invitation to participate as cooperating agencies under NEPA, including U.S. Environmental Protection Agency (EPA), the U.S. Army Corps of Engineers (Corps), NMFS, and Central California Irrigation District. The cooperating agencies have provided input that is being considered in preparation of this EIS/R.

San Joaquin River and Chowchilla Bypass

Scoping and Public Involvement Process

The lead agencies conducted public and stakeholder outreach activities to engage and inform all interested parties of Project activities. Engaging those interested parties helped to inform the process for scoping the Project alternatives and development of this EIS/R. Reclamation initiated the NEPA process by issuing a Notice of Intent on July 13, 2009, and DWR initiated the CEQA process by issuing a Notice of Preparation on the same day, to prepare an EIS/R and hold public scoping meetings. (Although initial CEQA actions were conducted by DWR, subsequent actions during the EIS/R process have been conducted by the CSLC as the State lead agency.)

The EIS/R scoping comment period began the date the Notice of Intent was issued and ended on August 14, 2009. The comments received were summarized in a Public Scoping Report released February 2010 (SJRRP 2010b). The NEPA scoping process also serves as the scoping process for compliance with other Federal laws such as the National Historic Preservation Act, Section 106.

Public involvement and outreach activities have enabled the Implementing Agencies to involve stakeholders and incorporate public and stakeholder input into the development of major Project documents, including this EIS/R. These activities seek to create an open and transparent process through which the general public, stakeholders, affected Third Parties, and other interested parties can track and participate in SJRRP activities, including the formulation of alternatives for this EIS/R. Ongoing public outreach activities conducted in support of the Project include the following:

- Hosting Project-specific landowner meetings as well as participating in SJRRP Technical Feedback Meetings with subject-matter experts, Settling Parties, affected stakeholders, and the general public to obtain information and viewpoints from individual attendees; provide updates on the status of Project work products; keep the Technical Feedback Group up-to-date with the current status of the Project; gather feedback on Project documents; and discuss potential opportunities and constraints that may arise.
- Making available technical memoranda and other milestone Project documents to the general public, stakeholders, affected Third Parties, and other interested parties on the SJRRP website.

Ornamental Palms in the Project Area

Purpose and Need for Action and Project Objectives

The purpose and objective of the Project are to implement portions of the Settlement consistent with the Act. The Act authorizes and directs the Secretary to implement the Settlement. Specifically, this Project is intended to implement Paragraphs 11(a)(1) and 11(a)(2) of the Settlement, which are authorized in Section 10004(a)(1) of the Act.

Paragraph 11(a)(1)

> *Creation of a bypass channel around Mendota Pool to ensure conveyance of at least 4,500 cfs from Reach 2B downstream to Reach 3. This improvement requires construction of a structure capable of directing flow down bypass and allowing the Secretary to make deliveries of San Joaquin River water into Mendota Pool when necessary;*

Paragraph 11(a)(2)

> *Modifications in channel capacity (incorporating new floodplain and related riparian habitat) to ensure conveyance of at least 4,500 cfs in Reach 2B between the Chowchilla Bifurcation Structure and the new Mendota Pool bypass Channel;*

The Settlement specifies the need, which requires modifications to Reach 2B and construction of a bypass around Mendota Pool in support of achieving the Restoration Goal (Settlement Paragraph 2):

> *... a goal of this Settlement is to restore and maintain fish populations in "good condition" in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally-reproducing and self-sustaining populations of salmon and other fish (the "Restoration Goal").*

The purpose of providing increased channel capacity and floodplain and riparian habitat in Reach 2B responds to the need to restore and maintain fish populations in "good condition" by providing fish passage and rearing habitat which benefit salmon and other native fish. Without the Project in Reach 2B, restoration activities would be unlikely to achieve the Settlement goals.

Reach 2B Channel prior to Interim Flows

Project Study Area

The Project study area or "Project area" includes areas that may be affected directly or indirectly by the Project alternatives. The Project footprint (township 13S, range 15E), shown in Figure S-1, has two major components: Reach 2B and the Mendota Pool Bypass. Reach 2B generally includes the area from the San Joaquin River Control Structure near the Chowchilla Bypass downstream to Mendota Dam. Potential Project improvements in Reach 2B, which vary by alternative, extend from the Chowchilla Bifurcation Structure on the upstream end to the head of the potential Mendota Pool Bypass channel or to Mendota Dam on the downstream end. However, Reach 2B improvements may also include areas just upstream of the Chowchilla Bifurcation Structure and may continue downstream of the head of the Mendota Pool Bypass or Mendota Dam, including the Pool area, as necessary to meet Project goals and objectives. The lateral extent of potential Project Reach 2B improvements, which varies by alternative, includes lands to the north and south of the San Joaquin River in Reach 2B.

San Joaquin River near San Mateo Road

The Mendota Pool Bypass element of the Project alternatives generally includes the area from the downstream end of the Reach 2B improvements to a tie-in location in Reach 3. Improvements for the Mendota Pool Bypass, which vary by alternative, extend from the area south of Mowry Bridge over Fresno Slough to the area north of Mendota Dam where the bypass ties into Reach 3. The Mendota Pool Bypass element of the Project alternatives also includes areas adjacent to and on the west side of Mendota Pool and Fresno Slough and areas to the south of the potential Project Reach 2B improvements. Areas indirectly affected by this Project include portions of Reach 3 downstream and Reach 2A upstream that are outside the direct Project footprint.

The Project area reflects current estimates of areas that may be affected by the Project alternatives. In this EIS/R, the area where direct and indirect effects may occur differs according to resource area; therefore, the geographic range and environmental conditions described herein vary by resource.

Alternatives Evaluated in this EIS/R

This EIS/R presents a No-Action/No-Project Alternative (hereafter called the No-Action Alternative) and four Action Alternatives to implement the Project:

- No-Action Alternative
- Alternative A (Compact Bypass with Narrow Floodplain and South Canal)
- Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative
- Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)
- Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Each Action Alternative includes the actions called for in the Settlement for the Mendota Pool Bypass and Reach 2B. Action Alternatives would be designed to provide:

- Conveyance of at least 4,500 cfs in Reach 2B and through the Mendota Pool Bypass
- Diversion and screening of up to 2,500 cfs from Reach 2B into Mendota Pool

Of the four Action Alternatives, there are two methods of bypassing Restoration Flows around Mendota Pool, two floodplain widths, and four ways to divert water into Mendota Pool (Table S-1).

Reach 2B during Interim Flows

Table S-1. Additional Activities Common or Related to Action Alternatives

ACTIVITY	ACTION ALTERNATIVE			
	A	B	C	D
Constructing a **channel and structures** capable of conveying up to 4,500 cfs of Restoration Flows around the Mendota Pool	♦	♦		
Constructing a **dam** capable of containing Mendota Pool within Fresno Slough so that 4,500 cfs of Restoration Flows can be conveyed around the Mendota Pool			♦	♦
Restoring floodplain habitat an average of approximately 3,000 feet wide to provide benefit to salmonids and other native fishes	♦		♦	
Restoring floodplain habitat an average of approximately 4,200 feet wide to provide benefit to salmonids and other native fishes		♦		♦
Constructing the **South Canal and structures** capable of conveying up to 2,500 cfs from Reach 2B to Mendota Pool	♦			
Constructing the **Bifurcation structure** capable of conveying up to 2,500 cfs from Reach 2B to Mendota Pool		♦		
Constructing the **Short Canal and structures** capable of conveying up to 2,500 cfs from Reach 2B to Mendota Pool			♦	
Constructing the **North Canal and structures** capable of conveying up to 2,500 cfs from Reach 2B to Mendota Pool				♦
Building levees capable of conveying flows up to 4,500 cfs with 3 feet of freeboard	♦	♦	♦	♦
Providing upstream and downstream fish passage for adult salmonids and other native fishes, and downstream fish passage for juvenile salmonids, between Reach 2A and Reach 3	♦	♦	♦	♦

Key:

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)
Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure)
Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)
Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)
cfs = cubic feet per second

No-Action/No-Project Alternative

Under this alternative, the Project would not be implemented. The No-Action Alternative is not consistent with the Settlement.

Existing conditions were developed for each resource area based on the availability of historical data and recent observations. Future conditions were based on reasonably foreseeable actions that would occur without the Project. The conditions under the No-Action Alternative are the conditions that are predicted to exist in the Project area during the planning period if the Project is not implemented. If the Project were not implemented, the components described in the Action Alternatives would not be implemented; however, the No-Action Alternative assumes that other components of the SJRRP, as described in the 2012 Record of Decision, and other reasonably foreseeable actions consistent with current management direction expected to occur in the Project area, would be implemented.

California Kingsnake in Reach 2B

The No-Action Alternative generally assumes no channel or structural improvements would be made in Reach 2B, and Restoration Flows would be reduced to not exceed

the existing Reach 2B capacity. It is assumed for the No-Action condition that agriculture would continue, and cropland would be the dominant cover type, consistent with the existing condition.

Alternative A

Alternative A (Compact Bypass with Narrow Floodplain and South Canal) would construct a channel between Reach 2B and Reach 3, the Compact Bypass channel, in order to bypass the Mendota Pool. Restoration Flows would enter Reach 2B, flow through the reach, then downstream to Reach 3 via the Compact Bypass channel. A canal to convey San Joaquin River water deliveries to Mendota Pool, the South Canal, would be built. The San Joaquin River control structure at the Chowchilla Bifurcation Structure would be removed, and a bifurcation structure would be built at the head of the South Canal to control flood diversions into the Chowchilla Bypass and water delivery diversions into Mendota Pool. Fish passage facilities and a fish screen would be built at the South Canal bifurcation structure to provide passage around the structure and prevent fish being entrained in the diversion. A fish barrier would be built in Reach 3 to direct up-migrating fish into the Compact Bypass channel. A new crossing would be built at the San Mateo Avenue crossing. See Figure S-3 and Figure S-4 for a plan view of the alternative's features.

Leopard Frog in Reach 2B

Alternative B

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the preferred alternative, would construct a channel between Reach 2B and Reach 3, the Compact Bypass channel, in order to bypass the Mendota Pool. Restoration Flows would enter Reach 2B at the Chowchilla Bifurcation Structure, flow through Reach 2B, then downstream to Reach 3 via the Compact Bypass channel. The existing Chowchilla Bifurcation Structure would continue to divert San Joaquin River flows into the Chowchilla Bypass during flood operations, and a fish passage facility and control structure modifications would be included at the San Joaquin River control structure at the Chowchilla Bifurcation Structure. A bifurcation structure would be built at the head of the Compact Bypass channel to control diversions into Mendota Pool. Fish passage facilities would be built at the Compact Bypass bifurcation structure to provide passage around the structure. The existing San Mateo Avenue crossing would be removed. See Figure S-5 and Figure S-6 for a plan view of the alternative's features.

Alternative C

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal) would build a dam across Fresno Slough, the Fresno Slough Dam, to contain the Mendota Pool, and it would utilize the existing river channel in order to bypass the Mendota Pool. Restoration Flows would enter Reach 2B at the Chowchilla Bifurcation Structure, flow through Reach 2B, then downstream to Reach 3 over the sill at Mendota Dam. Mendota Pool would be contained south of the Fresno Slough Dam. The existing Chowchilla Bifurcation Structure would continue to divert San Joaquin River flows into the Chowchilla Bypass during flood operations, and a fish passage facility and control structure modifications would be included at the San Joaquin River control structure at the Chowchilla Bifurcation Structure. A canal to convey San Joaquin River water

deliveries to Mendota Pool, the Short Canal, would be built adjacent to the Fresno Slough Dam. The Mendota Dam along with a control structure built at the head of the Short Canal would be used to control diversions into Mendota Pool through the Short Canal. Fish passage facilities at Mendota Dam and a fish screen on the Short Canal would be built to provide passage around Mendota Dam and prevent fish from being entrained in the diversion. A fish barrier would be built downstream of the Fresno Slough Dam to keep up-migrating fish in Reach 2B. A new crossing would be built at the San Mateo Avenue crossing. See Figure S-7 and Figure S-8 for a plan view of the alternative's features.

Alternative D

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal) would build a dam across Fresno Slough, the Fresno Slough Dam, to contain the Mendota Pool, and it would utilize the existing river channel in order to bypass the Mendota Pool. Restoration Flows would enter Reach 2B, flow through the reach, then downstream to Reach 3 over the sill at Mendota Dam. Mendota Pool would be contained south of the Fresno Slough Dam. A canal to convey San Joaquin River water deliveries to Mendota Pool, the North Canal, would be built. The San Joaquin River control structure at the Chowchilla Bifurcation Structure would be removed, and a bifurcation structure would be built at the head of the North Canal to control flood diversions into the Chowchilla Bypass and water delivery diversions into Mendota Pool. Fish passage facilities and a fish screen would be built at the North Canal bifurcation structure to provide passage around the structure and prevent fish being entrained in the diversion. A fish barrier would be built downstream of the Fresno Slough Dam to keep up-migrating fish in Reach 2B. The existing San Mateo Avenue crossing would be removed. See Figure S-9 and Figure S-10 for a plan view of the alternative's features.

White-faced Ibis

Elements Common to All Action Alternatives

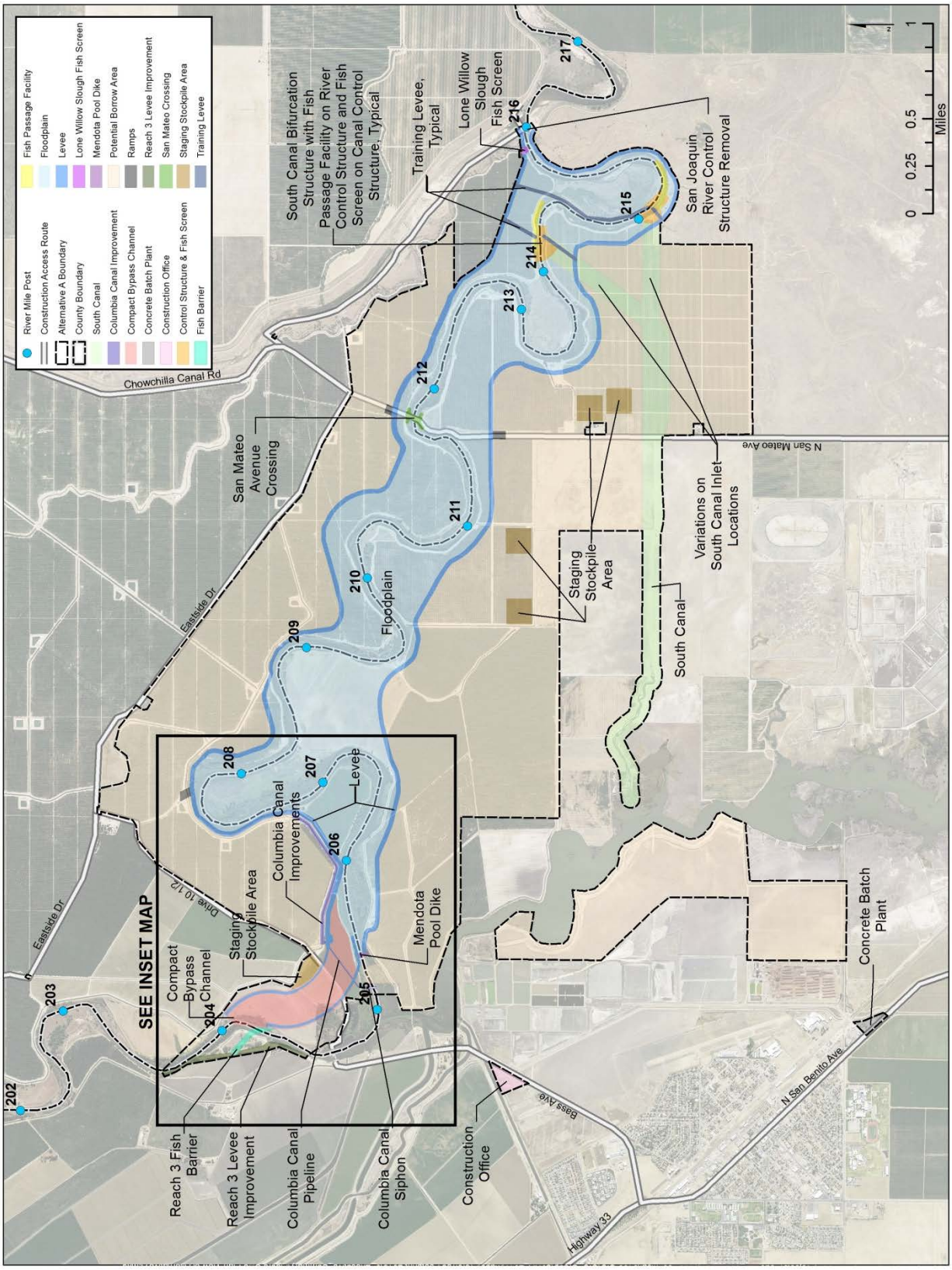
Some constructed elements are common to all Action Alternatives. Those elements are:

- Fish Habitat and Passage – One of the primary focuses of the Action Alternatives is to provide floodplain and riparian habitat to benefit migrating juvenile and adult salmonids and other native fishes. Floodplain and riparian habitats in the Action Alternatives would include a variety of native plant communities suited to the hydrology, soils, and climate of Reach 2B and the San Joaquin Valley. The Action Alternatives also include provision of fish passage at structures for salmonids and other native fish. These structures vary by alternative, but overall include fish screens, fish passage facilities, grade control structures, and bifurcation structures (under certain flows).
- Levees – Levees would be required along the Project area to contain Restoration Flows. While the height and footprint of the levees vary according to their locations along the channel and the ground elevation, the capacity, freeboard, and cross-section would be consistent. Localized backwater and redirection effects at Project structures would be considered during design of levee heights. Levees would be designed to maintain 3 feet of freeboard on the levees at 4,500 cfs. Levee alignments maintain a 300-foot buffer zone, where appropriate, between the levee and river channel to avoid impact to levees over time due to potential channel migration.

Chinook salmon

- Seepage Control Measures – Seepage of river water through or under levees is a concern for levee integrity and adjacent land uses. Through-seepage, water that seeps laterally through the levee section, would be addressed through proper levee design and construction (e.g., selection of low porosity materials and proper compaction). Under-seepage, water that seeps laterally by traveling under the levee section, is primarily controlled by the native soils beneath the levee, and seepage control measures would be included where native soils do not provide sufficient control.
- Borrow – Borrow material (suitable soils) would primarily be required for the construction of the levees, but it may also be used in the construction of other structures for foundation or backfill material. Levees may be constructed entirely of local borrow material, a mix of local and imported borrow material, or just imported borrow material.
- Levee and Structure Protection – Action Alternatives generally provide a minimum 300-foot buffer between the existing channel and the proposed levee, where appropriate and feasible. Locations that require erosion protection in the form of revetment include areas where the 300-foot buffer was not included due to the proximity of existing infrastructure, near the proposed structures, and along river bends less than 300 feet from the levee.

Figure S-3. Plan View of Alternative A
(Compact Bypass with Narrow Floodplain and South Canal)



ALTERNATIVES IN THIS EIS/R

Figure S-4. Inset Map of Alternative A
(Compact Bypass with Narrow Floodplain and South Canal)

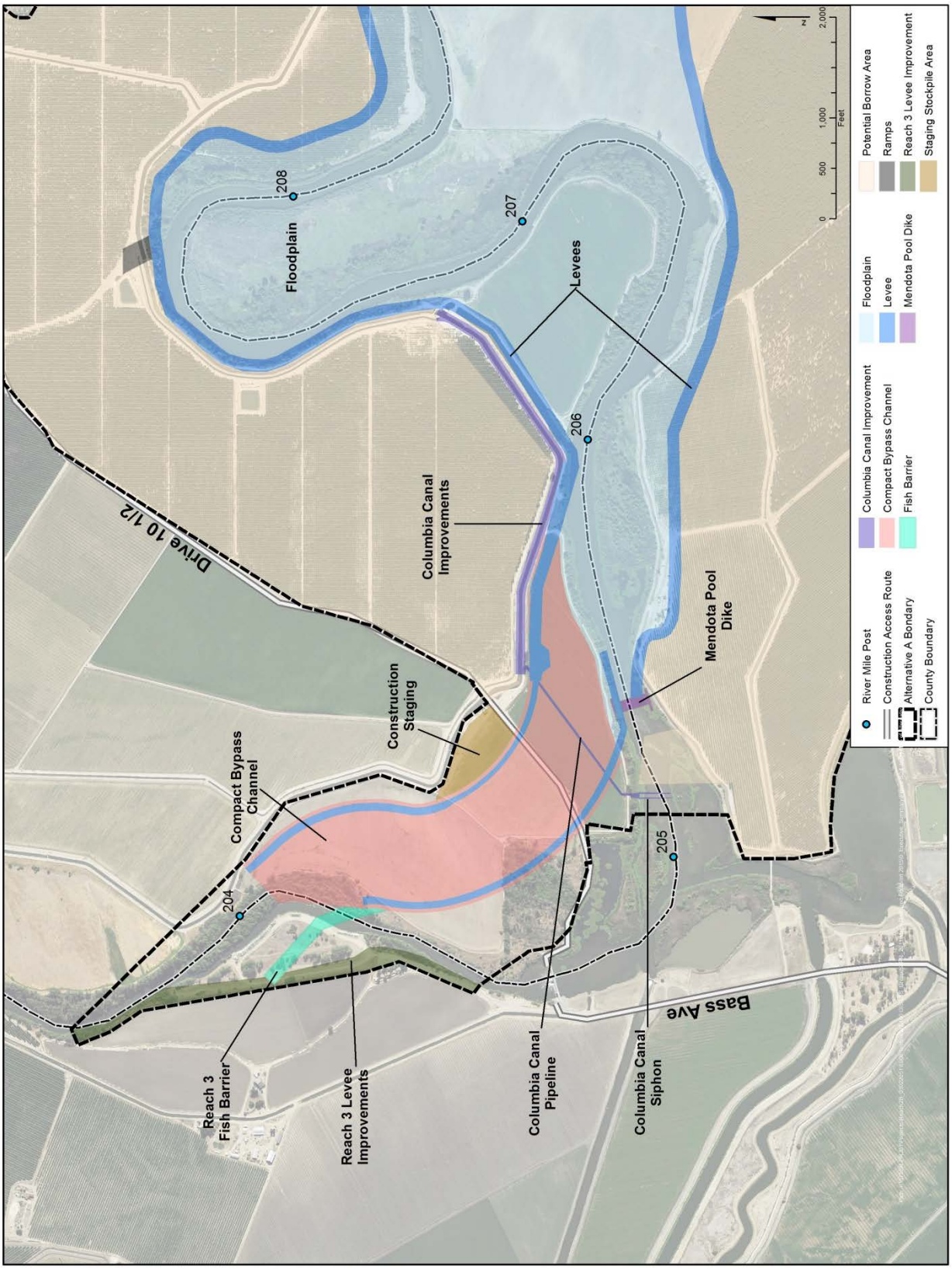
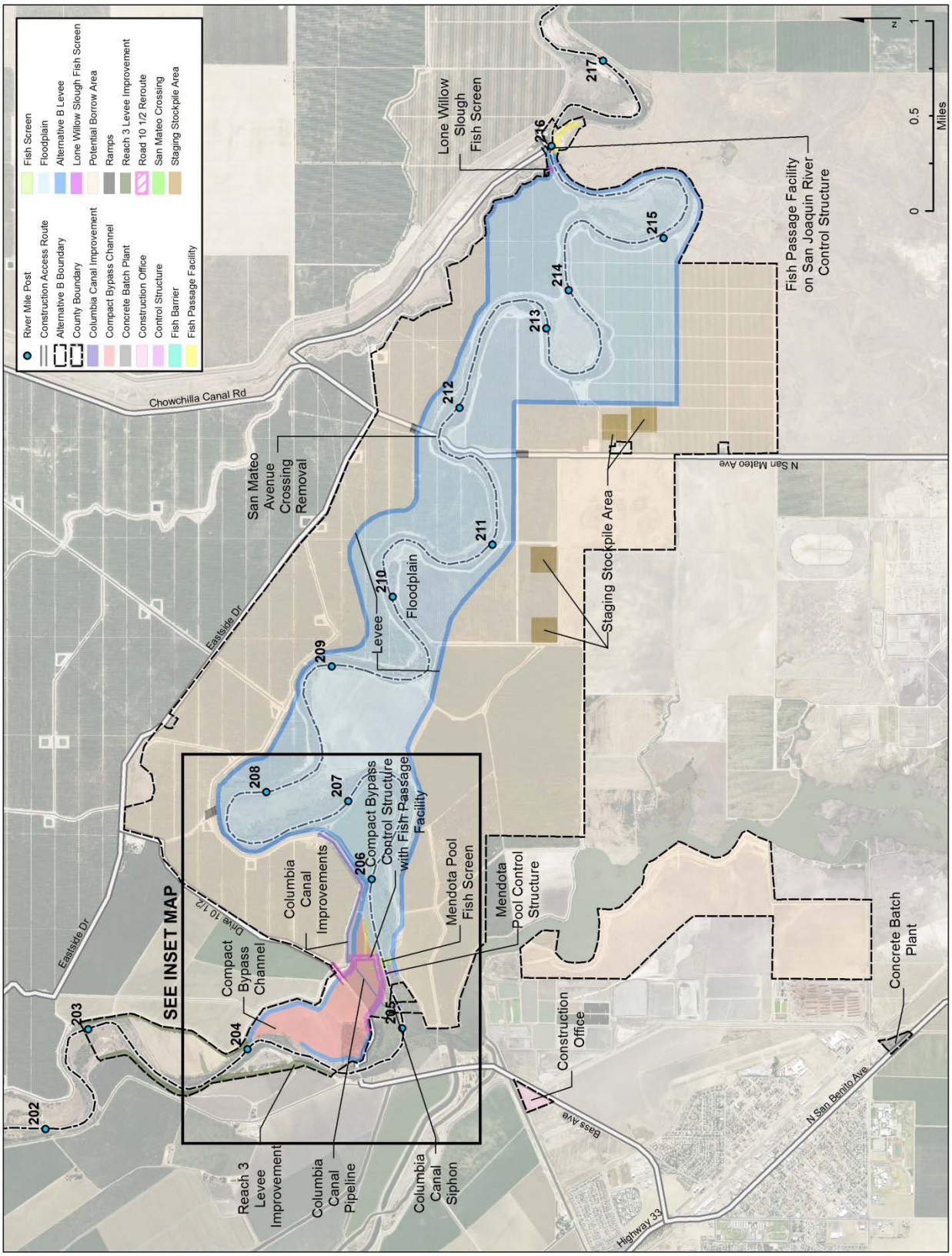


Figure S-5. Plan View of Alternative B
(Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure)



ALTERNATIVES IN THIS EIS/R

Figure S-6. Inset Map of Alternative B
(Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure)

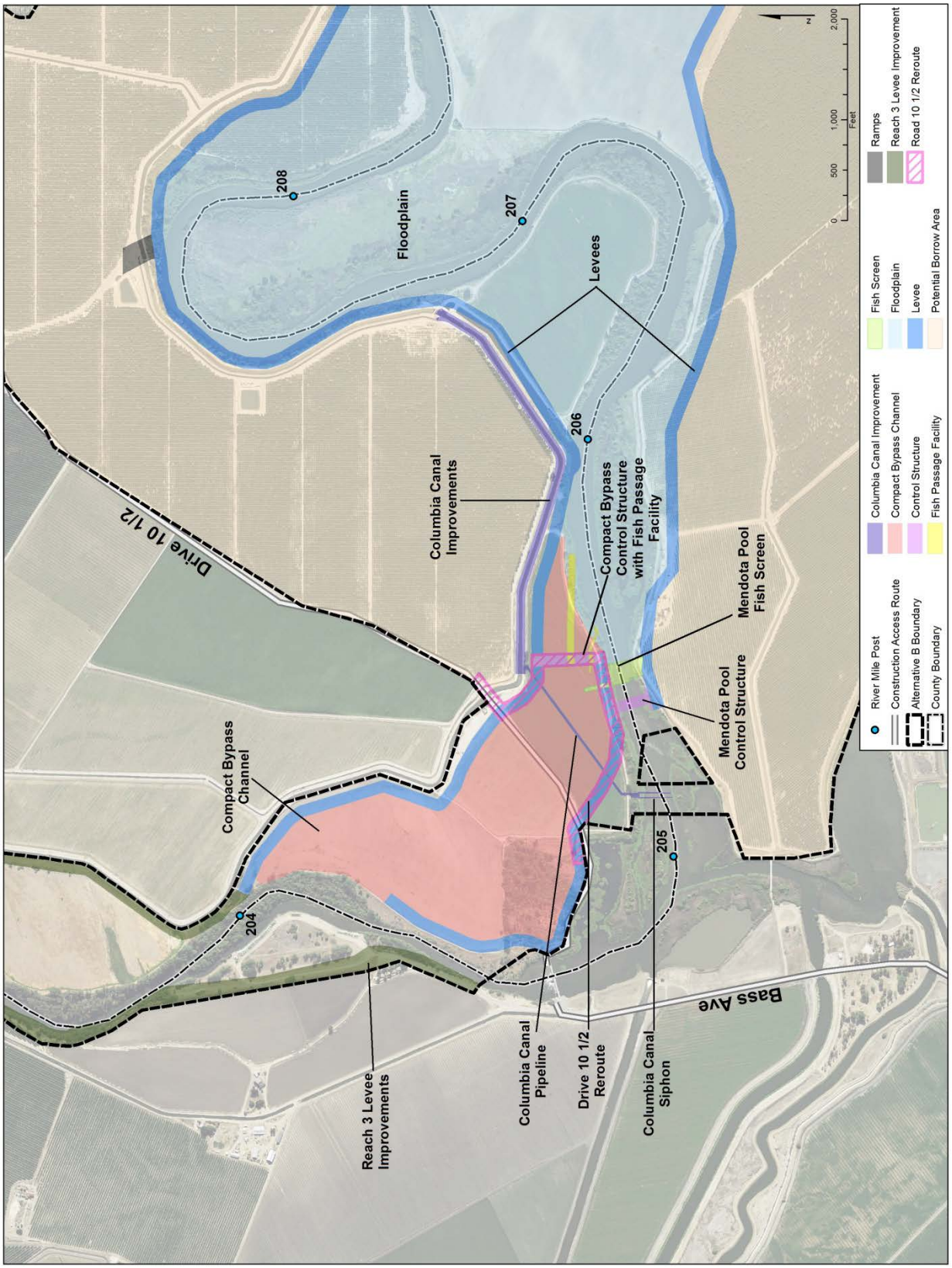


Figure S-7. Plan View of Alternative C
(Fresno Slough Dam with Narrow Floodplain and Short Canal)

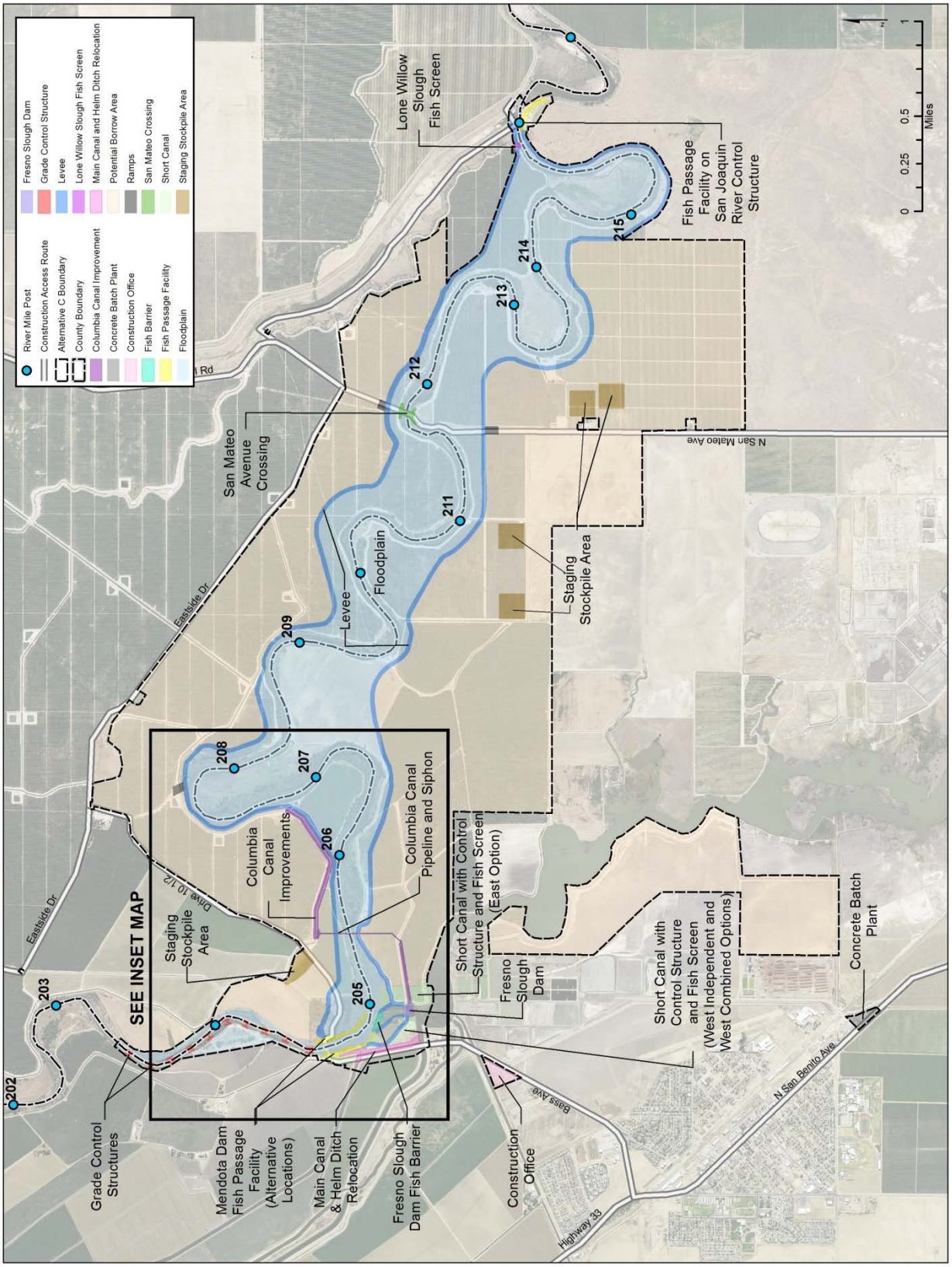


Figure S-8. Inset Map of Alternative C
(Fresno Slough Dam with Narrow Floodplain and Short Canal)

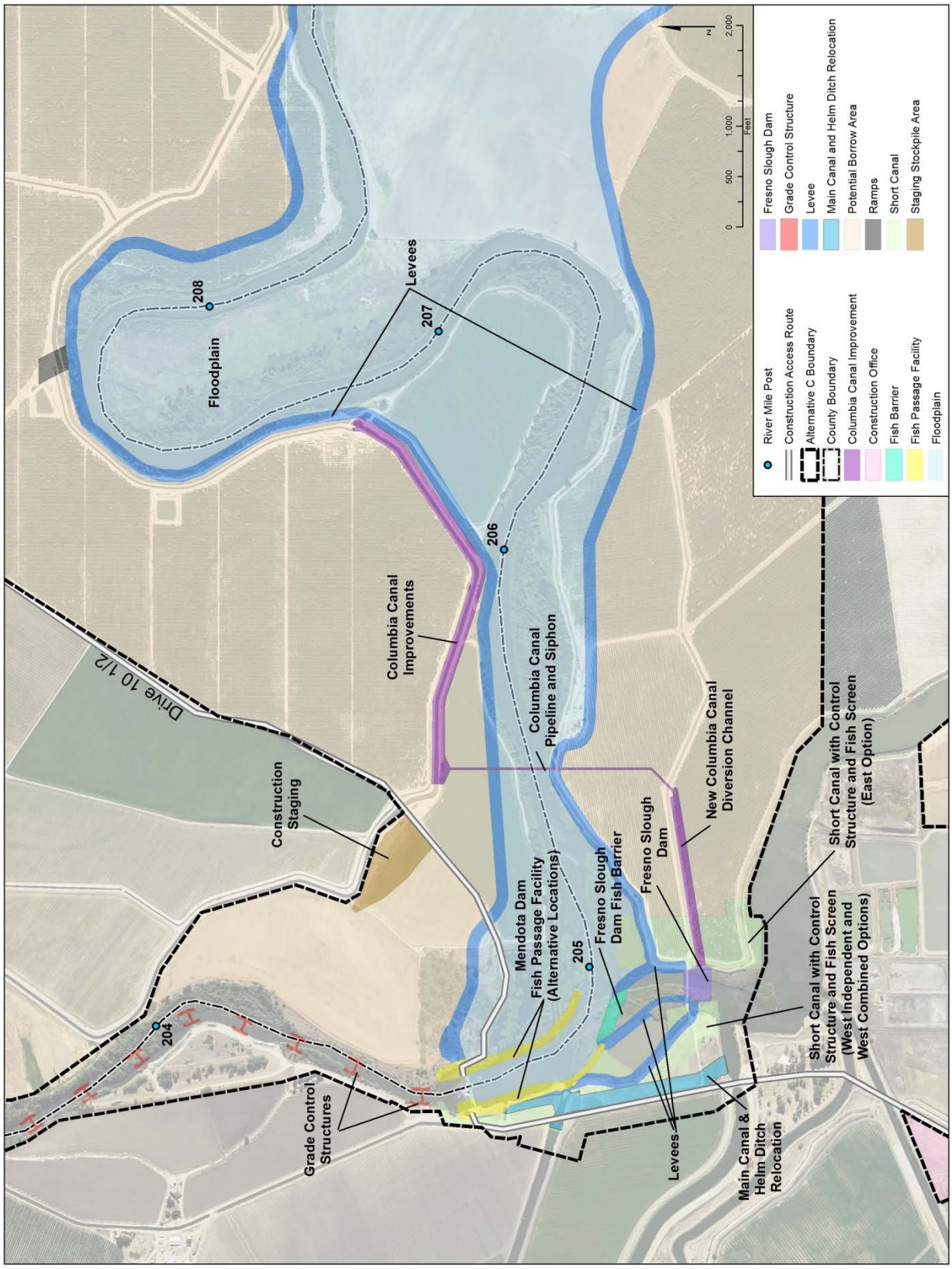
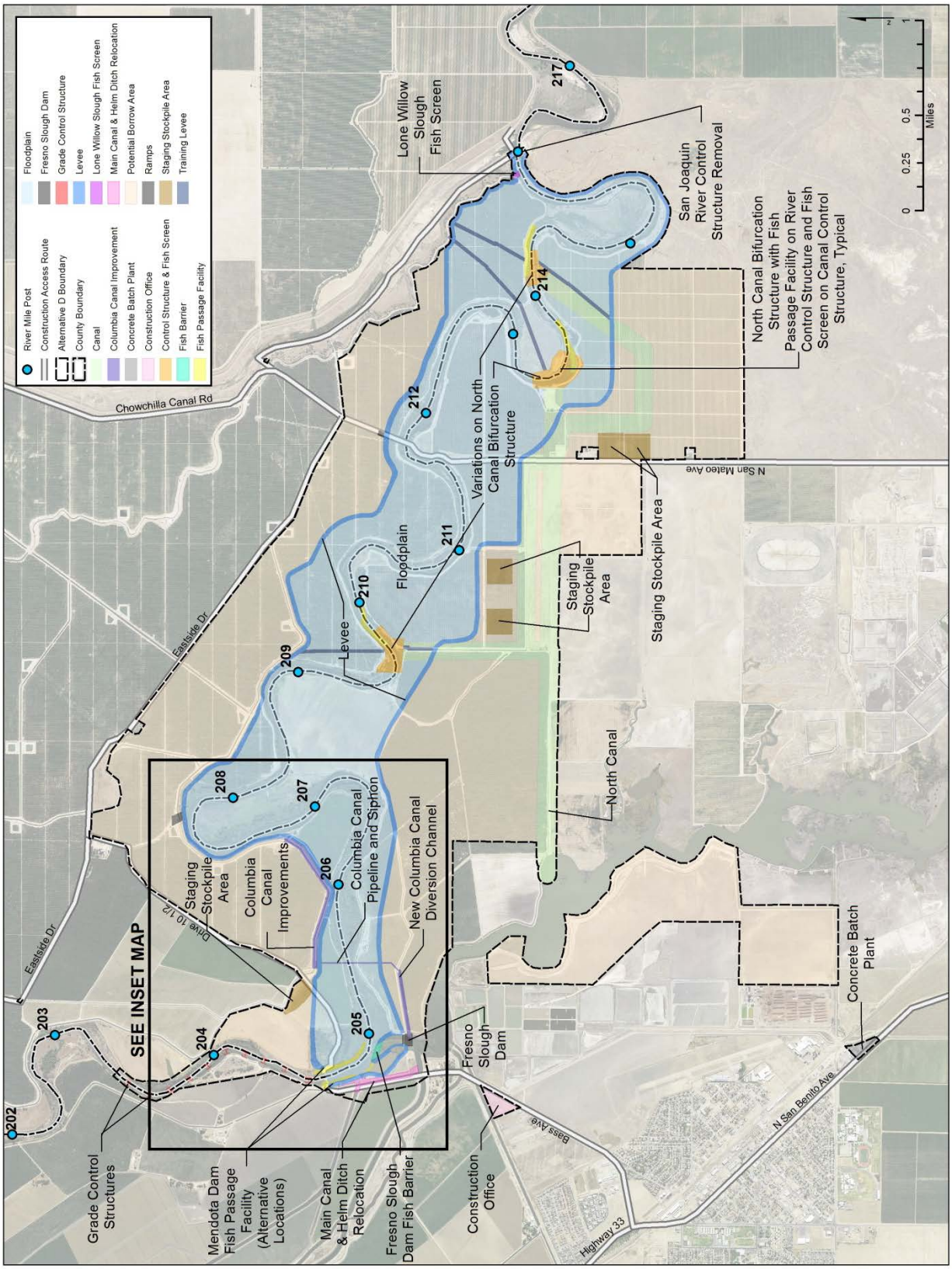
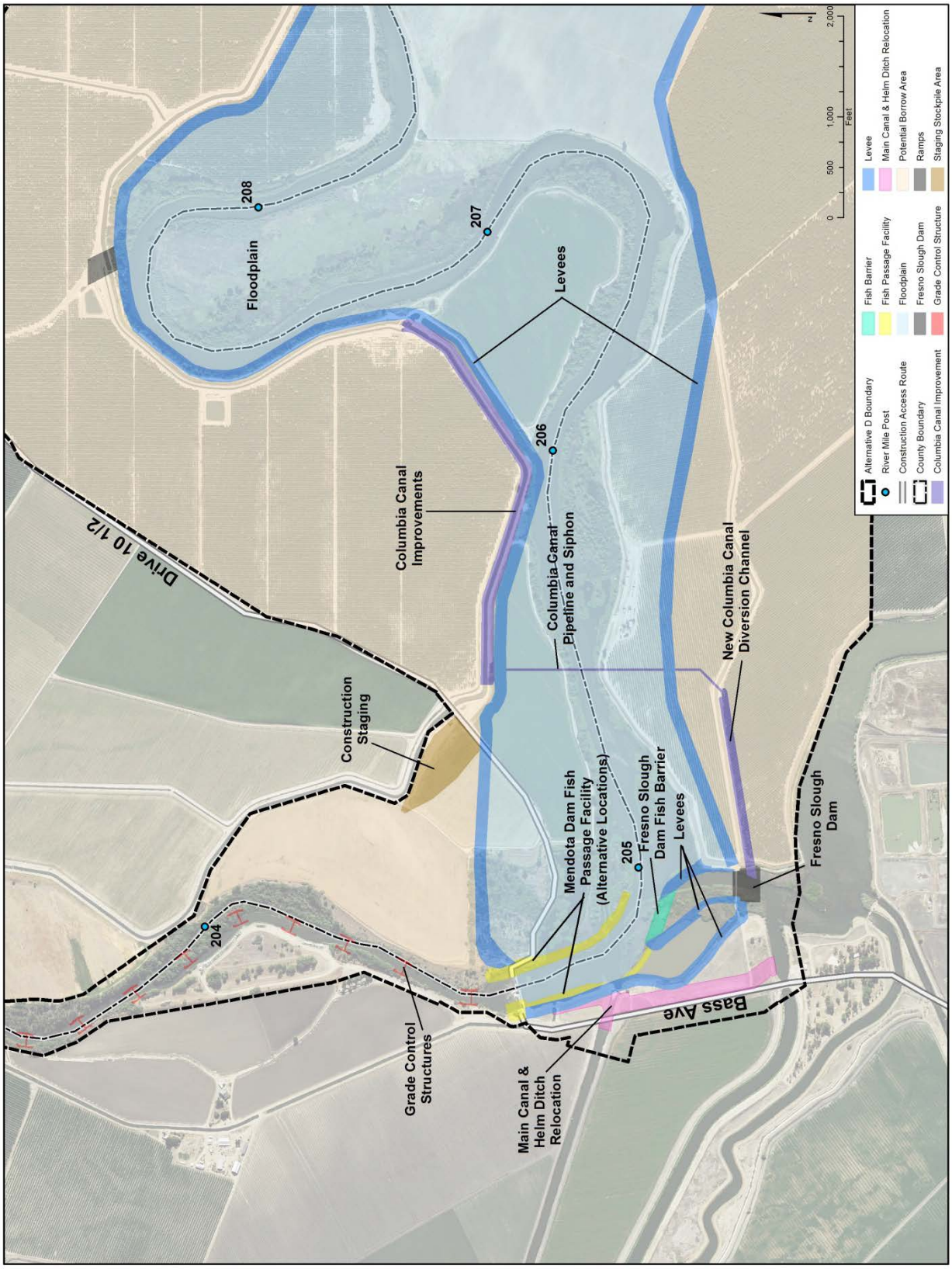


Figure S-9. Plan View of Alternative D
(Fresno Slough Dam with Wide Floodplain and North Canal)



ALTERNATIVES IN THIS EIS/R

Figure S-10. Inset Map of Alternative D
(Fresno Slough Dam with Wide Floodplain and North Canal)



- Removal of Existing Levees – Removal of portions of the existing levees is included and designed to expand the inundation area of the floodplain out to the proposed levees and improve connectivity between the river channel and proposed floodplain. The locations of existing levee removal would be based upon the hydraulic performance of the channel and floodplain. In certain locations, however, highly desirable existing vegetation (native and sensitive vegetation communities that can serve as seed banks for future vegetation communities) can be found on the existing levees. Where hydraulic performance and connectivity of the floodplain would not be negatively affected, portions of the existing levees with highly desirable vegetation would remain in place.
- Floodplain Grading – Floodplain and channel grading can provide benefits to salmon and other native fish by allowing inundation to occur at lower flows, by distributing suitable rearing habitats further into the floodplain, by connecting rearing habitat to primary production areas (shallow water habitat), by providing escape routes during receding flows, and by confining flows to a deeper, narrower channel to limit temperature increases.
- Infrastructure for Fish Monitoring – The designs for control structures, fish passage facilities, and fish screens include security fences and gates, mounting hardware, and electrical supply in order to conduct fish monitoring activities. The fish monitoring activities themselves are not included in this Project, and will be addressed in subsequent environmental analysis, as appropriate.
- Existing Infrastructure Relocations or Floodproofing – Existing infrastructure such as groundwater wells, pumps, electrical and gas distribution lines, water pipelines, and canals is located in the Project area and would require relocation or floodproofing to protect them from future Restoration Flows and increased floodplain area.
- Construction Access – Access for vehicles carrying materials, equipment, and personnel to and from the construction area would be provided via several existing roadways in the Project vicinity. Improvements may be required to upgrade roadways, pavements, and crossings for anticipated construction traffic and loads, provide adequate turning radii and site distances, and to control dust on non-paved roads.
- Revegetation of Temporary Disturbance Areas – Areas temporarily disturbed during construction would be restored to their previous contours, if feasible, and then seeded with a native vegetation seed mixture to prevent soil erosion. Some areas, such as borrow areas, may not be feasible to restore previous contours, but these areas would be smoothed and seeded.
- Land Acquisition – Additional lands would be acquired to accommodate the floodplain, levees, bypass channel, structures, and borrow. The amount of land acquisition varies with alternative.
- Phased Implementation – The Project may utilize a phased approach to implementation of the selected alternative. Phased implementation would involve building selected components of the Project in separate construction phases, allowing Project funding to be secured over time.

Reach 2B Riparian Corridor

In addition to these elements, the following activities are also common to all Action Alternatives:

- Operations and Maintenance – The Project includes long-term operations and maintenance of the proposed facilities and features.
- Monitoring Activities – Monitoring activities in Reach 2B could include flow monitoring, groundwater level monitoring, aerial and topographic surveys, vegetation surveys, sediment mobilization and monitoring, and passage and screen effectiveness.

Field Surveys in Reach 2B

Vegetation Surveys in Reach 2B

Environmental Commitments

Conservation Strategy

As part of SJRRP implementation, a comprehensive strategy for the conservation of listed and sensitive species and habitats has been prepared, and will be implemented in coordination with USFWS, NMFS, and DFW. The goals of the strategy are as follows:

- Conserve riparian vegetation and waters of the United States, including wetlands
- Control and manage invasive species
- Conserve special-status species

The SJRRP's Conservation Strategy includes conservation measures for biological resources that may be affected by Project actions (listed in Table S-2). These measures are the same as those presented in the PEIS/R (SJRRP 2011a, pages 2-55 to 2-79) and those detailed in Section 2.2.10 of this EIS/R.

Elderberry in Reach 2B

Table S-2. Conservation Measures for Biological Resources

IDENTIFIER	CONSERVATION MEASURE
VELB	**VALLEY ELDERBERRY LONGHORN BEETLE**
VELB-1	Avoid and minimize effects to species
VELB -2	Compensate for temporary or permanent loss of habitat
BNLL	**BLUNT-NOSED LEOPARD LIZARD**
BNLL-1	Avoid and minimize effects to species
BNLL-2	Compensate for temporary or permanent loss of habitat or species
PLANTS	**OTHER SPECIAL-STATUS PLANTS**
PLANTS-1	Avoid and minimize effects to special-status plants
GGS	**GIANT GARTER SNAKE**
GGS-1	Avoid and minimize loss of habitat for giant garter snake
GGS-2	Compensate for temporary or permanent loss of habitat
WPT	**WESTERN POND TURTLE**
WPT-1	Avoid and minimize loss of individuals
EAGLE	**BALD EAGLE AND GOLDEN EAGLE**
EAGLE-1	Avoid and minimize effects to bald and golden eagles (as defined in the Bald and Golden Eagle Protection Act)
SWH	**SWAINSON'S HAWK**
SWH-1	Avoid and minimize impacts to Swainson's Hawk
SWH-2	Compensate for loss of nest trees and foraging habitat
RAPTOR	**OTHER NESTING RAPTORS**
RAPTOR-1	Avoid and minimize loss of individual raptors
RAPTOR-2	Compensate for loss of nest trees
RNB	**RIPARIAN NESTING BIRDS: LEAST BELL'S VIREO**
RNB-1	Avoid effects to species
RNB-2	Avoid, minimize, and compensate for effects to species
MBTA	**OTHER BIRDS PROTECTED BY THE MIGRATORY BIRD TREATY ACT**
MBTA-1	Avoid and minimize effects to species
BRO	**BURROWING OWL**
BRO-1	Avoid loss of species
BRO-2	Minimize impacts to species
BAT	**SPECIAL-STATUS BATS**
BAT-1	Avoid and minimize loss of species
BAT-2	Compensate for loss of habitat
FKR	**FRESNO KANGAROO RAT**
FKR-1	Avoid and minimize effects to species
FKR-3	Compensate for temporary or permanent loss of habitat or species
SJKF	**SAN JOAQUIN KIT FOX**
SJKF-1	Avoid and minimize effects to species
PL	**PACIFIC LAMPREY**
PL-1	Avoid and minimize effects to species
RHSNC	**RIPARIAN HABITAT AND OTHER SENSITIVE NATURAL COMMUNITIES**
RHSNC-1	Avoid and minimize loss of riparian habitat and other sensitive natural communities
RHSNC-2	Compensate for loss of riparian habitat and other sensitive natural communities

Table S-2. Conservation Measures for Biological Resources

IDENTIFIER	CONSERVATION MEASURE
WUS	**WATERS OF THE UNITED STATES/WATERS OF THE STATE**
WUS-1	Identify and quantify wetlands and other waters of the United States
WUS-2	Obtain permits and compensate for any loss of wetlands and other waters of the United States/waters of the State
INV	**INVASIVE PLANTS**
INV-1	Implement the Invasive Vegetation Monitoring and Management Plan
CP	**CONSERVATION PLANS**
CP-1	Remain consistent with approved conservation plans
CP-2	Compensate effects consistent with approved conservation plans
GS	**SOUTHERN DISTINCT POPULATION SEGMENT OF NORTH AMERICAN GREEN STURGEON**
GS-1	Avoid and minimize loss of habitat and individuals
CVS	**CENTRAL VALLEY STEELHEAD**
CVS-1	Avoid loss of habitat and risk of take of species
CVS-2	Minimize loss of habitat and risk of take of species
SRCS	**CENTRAL VALLEY SPRING-RUN CHINOOK SALMON**
SRCS-1	Avoid and minimize loss of habitat and individuals
EFH	**ESSENTIAL FISH HABITAT (PACIFIC SALMONIDS AND STARRY FLOUNDER)**
EFH-1	Avoid loss of habitat and risk of take of species
EFH-2	Minimize loss of habitat and risk of take from implementation of construction activities

Ash-throated Flycatcher in Reach 2B

Minimize Flood Risk from Interim and Restoration Flows

The SJRRP's strategy for minimizing flood risk is to limit the maximum downstream extent and rate of Interim and Restoration flows for the given reach to then-existing channel capacities. This strategy is incorporated by reference from the PEIS/R (SJRRP 2011a, pages 2-22 through 2-28) and summarized in Section 2.2.10 of this EIS/R. These Program-wide commitments are documented in the PEIS/R Record of Decision (ROD), and no new Project-level actions to minimize flood risk from Interim and Restoration flows are being proposed.

Reach 2B during Interim Flows

Areas of Known Controversy and Issues to be Resolved

State CEQA Guidelines section 15123, subdivision (b), requires that an Executive Summary identify "areas of controversy known to the lead agency including issues raised by agencies and the public." The alternatives development process provided opportunities for early stakeholder involvement and input. Primary stakeholders include Federal, State, and local agencies, landowners, the Restoration Administrator and Technical Advisory Committee of the SJRRP, non-governmental organizations, and the public. Comments received during the scoping process include topics related to agriculture, air quality, canal distribution systems, economic development, flood control and levees, groundwater and wells, wells, Interim Flows, surface water, traffic, water quality, wetland and riparian environment, SJRRP actions, and the construction schedule. Areas of known controversy include the potential for groundwater seepage to occur in agricultural areas outside of the floodplain, the potential for future long-term recreational development of the Project area, and the need for a Mendota Pool Fish Screen and Reach 3 Fish Barrier. Groundwater seepage will be addressed during levee design and through the SJRRP's seepage management activities, which are being analyzed in separate environmental analysis, as appropriate (potential groundwater impacts of the Project are analyzed and disclosed in this EIS/R and mitigation measures are discussed as appropriate). Although recreational development is not within the scope of the Project, portage facilities around Project structures would include signage regarding safety and trespass issues. The Mendota Pool Fish Screen and Reach 3 Fish Barrier are analyzed in the Project alternatives; The Record of Decision for this Project will describe the project elements that Reclamation intends to implement as the selected alternative for the Project. There are no remaining issues to be resolved.

Red-tailed Hawk in Reach 2B

Consensus-Based Alternative Selection

A meeting was held on January 29, 2013, in order to introduce the consensus-based alternative concept and approach to the adjacent landowners, canal companies, irrigation districts, levee districts, cities, and the Settling Parties. The consensus-based alternative approach gave these entities the opportunity to provide input on the Project alternatives, and their input was considered during the identification of the preferred alternative. Following several meetings with the individuals and groups listed above, Reclamation and CSLC identified a preferred alternative, Alternative B, based on the input received on the Action Alternatives. The preferred alternative identified in this EIS/R is preliminary, and a final alternative will not be selected for implementation until consideration of comments received on the public draft EIS/R. The alternative selected for implementation will be articulated in the Record of Decision, which will be completed no less than 30 days following the release of the final EIS/R, and in the findings and other documents completed in accordance with CEQA.

Orchard in bloom in the San Joaquin Valley

Summary and Comparison of Impacts and Mitigation Measures

The impact conclusions and associated mitigation measures for the 21 resource topics evaluated in this EIS/R are summarized Tables S-3 and S-4. Impacts with the potential to result in a cumulatively considerable contribution to a significant cumulative impact are shown in Table S-5. Most action alternatives have the same impact level of significance before and after mitigation. For these impacts, Table S-3 below compares the No-Action alternative to the Action Alternatives together.

Table S-3. Summary of Impacts and Mitigation Measures

IMPACTS	ALTERNATIVE	LEVEL OF SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES / CONSERVATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION / CONSERVATION MEASURE
AIR QUALITY				
AQ-1: Create Excess Amounts of Construction Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS	No-Action	No Impact	--	No Impact
	Action Alternatives	Significant	AQ-1A: Reduce Criteria Exhaust Emissions from Construction Equipment AQ-1B: Reduce Criteria Exhaust Emissions from Material Hauling Vehicles AQ-1C: Offset Project Construction Emissions Through a SJVAPCD Voluntary Emission Reduction Agreement	LTS
AQ-2: Conflict with Applicable Plans or Policies Related to Air Quality	No-Action	No Impact	--	No Impact
	Action Alternatives	Significant	AQ-2: Reduce or Offset Project Emissions	LTS
AQ-3: Expose Sensitive Receptors to Substantial Air Pollutants Associated with Construction	No-Action	No Impact	--	No Impact
	Action Alternatives	Significant	AQ-3A: Reduce Diesel Particulate Matter Emissions from Construction Equipment AQ-3B: Reduce Diesel Particulate Matter Emissions from Material Hauling Vehicles	SU
AQ-4: Create Excess Amounts of Operational Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS

Table S-3. Summary of Impacts and Mitigation Measures

IMPACTS	ALTERNATIVE	LEVEL OF SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES / CONSERVATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION / CONSERVATION MEASURE
AQ-5: Expose Sensitive Receptors to Substantial Air Pollutants Associated with Operation	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
AQ-6: Create Objectionable Odors from Construction	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
AQ-7: Create Objectionable Odors from Operation	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
BIOLOGICAL RESOURCES - FISHERIES				
AQUA-1: Effects on Fish Habitat and Passage for Local Fish Populations	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
AQUA-2: Effects on Salmonid Rearing Habitat	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
AQUA-3: Effects on Upstream Migration of Adult Salmonids	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
AQUA-4: Effects on Downstream Migration of Juvenile Salmonids	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
AQUA-5: Effects of In-Channel Construction Activities on Fish Species Within Reach 2B	No-Action	No Impact	--	No Impact
	Action Alternatives	--	<u>Essential Fish Habitat (Pacific Salmonids)</u> EFH-1: Avoid Loss of Habitat and Risk of Take of Species EFH-2: Minimize Loss of Habitat and Risk of Take from Implementation of Construction Activities <u>Central Valley Steelhead</u> CVS-1: Avoid Loss of Habitat and Risk of Take of Species CVS-2: Minimize Loss of Habitat and Risk of Take of Species <u>Pacific Lamprey</u> PL-1: Avoid and Minimize Effects to Species <u>Southern Distinct Population Segment of North American Green Sturgeon</u> GS-1: Avoid and Minimize Loss of Habitat and Individuals <u>Central Valley Spring-Run Chinook Salmon</u> SRCS-1: Avoid and Minimize Loss of Habitat and Individuals	LTS

Table S-3. Summary of Impacts and Mitigation Measures

IMPACTS	ALTERNATIVE	LEVEL OF SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES / CONSERVATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION / CONSERVATION MEASURE
AQUA-6: Effects of Floodplain Use By Agriculture on Fish Species Within Reach 2B	No-Action	No Impact	--	No Impact
	A	LTS	--	LTS
	B	LTS	--	LTS
	C	No Impact	--	No Impact
	D	LTS	--	LTS
AQUA-7: Effects on Occurrence of Native Fish Species Within Reach 2B	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
AQUA-8: Effects on Predation of Juvenile Salmonids and Native Fish Species	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
AQUA-9: Effects on the Aquatic Food Web within Reach 2B	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
BIOLOGICAL RESOURCES - VEGETATION				
VEG-1: Substantially Alter Riparian Habitat and Other Sensitive Communities during Construction	No-Action	No impact	--	No impact
	Action Alternatives	--	Riparian Habitat and Other Sensitive Natural Communities RHSNC-1: Avoid and Minimize Loss of Riparian Habitat and Other Sensitive Natural Communities RHSNC-2: Compensate for Loss of Riparian Habitat and Other Sensitive Natural Communities Invasive Plants INV-1: Implement the Invasive Vegetation Monitoring and Management Plan	LTS
VEG-2: Substantially Alter Riparian Habitat and Other Sensitive Communities during the Operations and Maintenance Phase of the Project	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
VEG-3: Facilitate Increase in Distribution and Abundance of Invasive Plants in the Project Area	No-Action	--	Invasive Plants PEIS/R INV-1: Implement the Invasive Vegetation Monitoring and Management Plan	LTS
	Action Alternatives	--	Invasive Plants INV-1: Implement the Invasive Vegetation Monitoring and Management Plan	LTS
VEG-4: Conflict with Provisions of Local Plans in the Project Area	No-Action	No Impact	--	No Impact
	Action Alternatives	Beneficial	--	Beneficial
BIOLOGICAL RESOURCES - WILDLIFE				
WILD-1: Project Effects on Special-Status Invertebrate Species	No-Action	Beneficial	--	Beneficial
	Action Alternatives	--	Valley Elderberry Longhorn Beetle VELB-1: Avoid and Minimize Effects to Species	LTS

Table S-3. Summary of Impacts and Mitigation Measures

IMPACTS	ALTERNATIVE	LEVEL OF SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES / CONSERVATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION / CONSERVATION MEASURE
			VELB-2: Compensate for Temporary or Permanent Loss of Habitat	
WILD-2: Project Effects on Special-Status Reptile Species	No-Action	LTS	--	LTS
	Action Alternatives	--	Blunt-Nosed Leopard Lizard BNLL-1: Avoid and Minimize Effects to Species BNLL-2: Compensate for Temporary or Permanent Loss of Habitat or Species Giant Garter Snake GGS-1: Avoid and Minimize Loss of Habitat for Giant Garter Snake GGS-2: Compensate for Temporary or Permanent Loss of Habitat Invasive Plants INV-1: Implement the Invasive Vegetation Monitoring and Management Plan	LTS
WILD-3: Project Effects on Special-Status Bird Species	No-Action	Beneficial	--	Beneficial
	Action Alternatives	--	Other Birds Protected by the Migratory Bird Treaty Act MBTA-1: Avoid and Minimize Effects to Species Other Nesting Raptors RAPTOR-1: Avoid and Minimize Loss of Individual Raptors RAPTOR-2: Compensate for Loss of Nest Trees Riparian Nesting Birds (Least Bell's Vireo) RNB-1: Avoid Effects to Species RNB-2: Avoid, Minimize, and Compensate for Effects to Species Swainson's Hawk SWH-1: Avoid and Minimize Impacts to Swainson's Hawk SWH-2: Compensate for Loss of Nest Trees and Foraging Habitat Burrowing Owl BRO-1: Avoid Loss of Species BRO-2: Minimize Impacts to Species Invasive Plants INV-1: Implement the Invasive Vegetation Monitoring and Management Plan	LTS

Table S-3. Summary of Impacts and Mitigation Measures

IMPACTS	ALTERNATIVE	LEVEL OF SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES / CONSERVATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION / CONSERVATION MEASURE
WILD-4: Project Effects on Special-Status Mammal Species	No-Action	Beneficial	--	Beneficial
	Action Alternatives	--	Special-Status Bats BAT-1: Avoid and Minimize Loss of Species BAT-2: Compensate for Loss of Habitat Fresno Kangaroo Rat FKR-1: Avoid and Minimize Effects to Species FKR-3: Compensate for Temporary or Permanent Loss of Habitat or Species San Joaquin Kit Fox SJKF-1: Avoid and Minimize Effects to Species	LTS
WILD-5: Project Effects on Wildlife Movement Corridors	No-Action	Beneficial	--	Beneficial
	Action Alternatives	--	Riparian Habitat and Other Sensitive Natural Communities RHSNC-1: Avoid and Minimize Loss of Riparian Habitat and Other Sensitive Natural Communities RHSNC-2: Compensate for Loss of Riparian Habitat and Other Sensitive Natural Communities Essential Fish Habitat (Pacific Salmonids) EFH-1: Avoid Loss of Habitat and Risk of Take of Species EFH-2: Minimize Loss of Habitat and Risk of Take from Implementation of Construction Activities	LTS
WILD-6: Long-term Habitat Improvement in Reach 2B	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS				
CC-1: Impacts from GHG Emissions Associated with Project Construction	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
CC-2: Impacts from GHG Emissions Associated with Project Operation	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
CC-3: Changes in Land Use That Result in a Net Increase in GHG Emissions	No-Action	No Impact	--	No Impact
	Action Alternatives	Beneficial	--	Beneficial

Table S-3. Summary of Impacts and Mitigation Measures

IMPACTS	ALTERNATIVE	LEVEL OF SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES / CONSERVATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION / CONSERVATION MEASURE
CULTURAL RESOURCES				
CUL-1: Effects on Archaeological Resources from Ground Disturbing Activities during Construction	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	CUL-1A: Comply with Section 106 of the NHPA or Equivalent CUL-1B: Conduct Subsurface Testing and/or Archaeological Monitoring in Proximity to Identified Sites or Areas of Sensitivity CUL-1C: Halt Work in the Event of An Archaeological Discovery CUL-1D: Plan an Intentional Site Burial Preservation in Place CUL-1E: Avoid Soil Borrowing in the Vicinity Known Archaeological Resources	LTS
CUL-2: Effects on Historical Properties Listed or Eligible for Listing in the National or California Register	No-Action	No Impact	--	No Impact
	A	No Impact	--	No Impact
	B	No Impact	--	No Impact
	C	PS	CUL-3: Follow the Secretary of the Interior's Standards for the Treatment of Historic Properties	LTS
	D	PS		LTS
CUL-3: Effects on Cultural Resources during the Operations and Maintenance Phase of the Project	No-Action	PS	--	PS
	Action Alternatives	LTS	--	LTS
GEOLOGY AND SOILS				
GEO-1: Effects on Mineral and Soils Resources	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
GEO-2: Soil Erosion Effects	No-Action	LTS	--	LTS
	Action Alternatives	LTS	--	LTS
GEO-3: Adverse Soil Conditions	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
GEO-4: Adverse Seismicity Effects	No-Action	No Impact	--	No Impact
	Action Alternatives	No Impact	--	No Impact
HYDROLOGY - FLOOD MANAGEMENT				
FLD-1: Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding	No-Action	PS	--	PS
	Action Alternatives	LTS	--	LTS
FLD-2: Substantially Reduce Opportunities For Levee and Flood System Facilities Inspection and Maintenance	No-Action	LTS	--	LTS
	Action Alternatives	LTS	--	LTS

Table S-3. Summary of Impacts and Mitigation Measures

IMPACTS	ALTERNATIVE	LEVEL OF SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES / CONSERVATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION / CONSERVATION MEASURE
FLD-3: Substantially Alter Existing Drainage Patterns or Substantially Increase the Rate or Amount of Surface Runoff in a Manner Which Would Result in Flooding On- or Off-Site	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
FLD-4: Placement of Structures Within a 100-Year Flood Hazard Area that Would Adversely Impede or Redirect Flood Flows	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
HYDROLOGY - GROUNDWATER				
GRW-1: Temporary Construction-Related Effects on Groundwater Quality	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	GRW-1A: Prepare and Implement a Stormwater Pollution Prevention Plan GRW-1B: Prepare and Implement a Construction Groundwater Management Plan	LTS
GRW-2: Long-term Changes in Groundwater Quality	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
GRW-3: Changes in Groundwater Levels	No-Action	LTS	--	LTS
	Action Alternatives	LTS	--	LTS
GRW-4: Changes in Groundwater Recharge	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
HYDROLOGY - SURFACE WATER RESOURCES AND WATER QUALITY				
GEM-1: Substantially Altering the Existing Drainage Pattern, Including Alteration of the Course of the River, in a Manner Which Would Result in Substantial On- or Off-Site Erosion	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
GEM-2: Increased Aggradation or Degradation that Causes a Substantial Increase in Channel Instability within Reach 2B.	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
GEM-3: Increases in Lateral Erosion that Could Damage Existing and/or Proposed Levees or Other Infrastructure within Reach 2B	No-Action	LTS	--	LTS
	Action Alternatives	LTS	--	LTS
GEM-4: Short- and Long-Term Increases in Sediment Load that Could Cause Substantial Increases in Channel	No-Action	LTS	--	No Impact
	Action Alternatives	LTS	--	LTS

Table S-3. Summary of Impacts and Mitigation Measures

IMPACTS	ALTERNATIVE	LEVEL OF SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES / CONSERVATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION / CONSERVATION MEASURE
Instability in Downstream Reaches				
SWQ-1: Construction-Related Effects on Water Quality	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	SWQ-1: Develop & Implement SWPPP	LTS
SWQ-2: Long-Term Effects on Water Quality from Mobilization of Mendota Pool Sediments	No-Action	LTS	--	LTS
	Action Alternatives	LTS	--	LTS
SWQ-3: Long-Term Effects on Water Quality from Floodplain Inundation of Prior Agricultural Soils	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	SWG-3: Minimize Use of Pesticide and Herbicide Contaminated Soil	LTS
SWQ-4: Long-Term Effects on Water Quality from Agricultural Practices Within the New Floodplain	No-Action	No Impact	--	No Impact
	A	LTS	--	LTS
	B	LTS	--	LTS
	C	No Impact	--	No Impact
	D	LTS	--	LTS
HYDROLOGY - WETLANDS AND AQUATIC RESOURCES				
WET-1: Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands or Other Waters during Construction	No-Action	No Impact	--	No Impact
	Action Alternatives	--	Waters of the United States/Waters of the State WUS-1: Identify and Quantify Wetlands and Other Waters of the United States WUS-2: Obtain Permits and Compensate for Any Loss of Wetlands and Other Waters of the United States/Waters of the State	LTS
WET-2: Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands or Other Waters during the Operations and Maintenance Phase	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
WET-3: Conflict with Provisions of Local or Regional Plans Regarding Conservation Lands	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
LAND USE PLANNING AND AGRICULTURAL RESOURCES				
LU-1: Removal of Land from Agricultural Production	No-Action	No Impact	--	No Impact
	Action Alternatives	Significant	LU-1: Preserve Agricultural Productivity of Designated Farmland to the Extent Possible	SU
LU-2: Conversion of Designated Farmland to Non-Agricultural Uses	No-Action	No Impact	--	No Impact
	Action Alternatives	Significant	LU-2: Preserve Agricultural Productivity of Designated Farmland to the Extent Possible	SU

Table S-3. Summary of Impacts and Mitigation Measures

IMPACTS	ALTERNATIVE	LEVEL OF SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES / CONSERVATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION / CONSERVATION MEASURE
LU-3: Conflict with Williamson Act Contracts	No-Action	No Impact	--	No Impact
	Action Alternatives	Significant	LU-3: Preserve Agricultural Productivity of Designated Farmland to the Extent Possible	SU
LU-4: Degradation of Agricultural Land Productivity due to Seepage	No-Action	LTS	--	LTS
	Action Alternatives	LTS	--	LTS
LU-5: Conflict with Applicable Land Use Plans Regarding Agricultural Lands	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	LU-5: Notify County Planning Agencies of General Plan and Zoning Ordinance Inconsistencies	LTS
LU-6: Diminishment of Agricultural Production by Increased Disease	No-Action	LTS	--	LTS
	Action Alternatives	LTS	--	LTS
NOISE AND VIBRATION				
NOI-1: Exposure of Sensitive Receptors to Temporary Construction Noise	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	NOI-1: Reduce Temporary and Short-Term Noise Levels from Construction-Related Equipment Near Sensitive Receptors	LTS
NOI-2: Exposure of Sensitive Receptors to Temporary Construction Vibration	No-Action	No Impact	--	No Impact
	A	LTS	--	LTS
	B	LTS	--	LTS
	C	PS	NOI-2: Minimize Vibration Related Effects	LTS
	D	PS		LTS
NOI-3: Increased Off-Site Vehicular Traffic Noise Due to Construction Related Trips	No-Action	LTS	--	LTS
	Action Alternatives	PS	NOI-3: Reduce Temporary Noise Levels from Construction-Related Traffic Increases Near Sensitive Receptors	LTS
NOI-4: Noise Effects Due to Operations and Maintenance Activities	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
PALEONTOLOGY				
PAL-1: Possible Damage to or Destruction of Unique Paleontological Resources	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	PAL-1: Stop Work If Paleontological Resources Are Encountered During Earthmoving Activities and Implement Recovery Plan	LTS
PUBLIC HEALTH AND HAZARDOUS MATERIALS				
HAZ-1: Creation of a Substantial Hazard through the Routine Transport, Use, or Disposal of Hazardous Materials or through Reasonably Foreseeable Upset and Accident Conditions Involving the Release of Hazardous Materials	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS

Table S-3. Summary of Impacts and Mitigation Measures

IMPACTS	ALTERNATIVE	LEVEL OF SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES / CONSERVATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION / CONSERVATION MEASURE
HAZ-2: Increased Exposure to Hazardous Materials of People Residing or Working in the Project Area	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	HAZ-2A: Follow General Hazardous Materials Guidelines HAZ -2B: Properly Dispose of Hazardous Building Components HAZ -2C: Properly Dispose of Pesticides HAZ -2D: Properly Manage Discolored or Odiferous Soils HAZ -2E: Properly Remove Underground Storage Tanks	LTS
HAZ-3: Creation of a Substantial Hazard from Disturbance of Known Hazardous Material Sites	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	HAZ-3: Minimize Disturbance to Known Hazardous Material Site	LTS
HAZ-4: Creation of a Substantial Hazard from Mobilization of Soil Contaminants on the Floodplain	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	HAZ-4: Minimize Use of Pesticide and Herbicide Contaminated Soil	LTS
HAZ-5: Exposure of People to Increased Risk of Diseases	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	HAZ-5A: Minimize Exposure to Potential West Nile Virus Vectors HAZ-5B: Minimize Exposure to Potential Hantavirus Vectors HAZ-5C: Minimize Exposure to Valley Fever	LTS
HAZ-6: Creation of a Substantial Hazard from Decommissioned Wells	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	HAZ-6: Minimize the Disturbance of Idle or Abandoned Wells	LTS
HAZ-7: Increased Hazardous Emissions or Handling of Hazardous Materials, Substances, or Wastes within One-Quarter Mile of a School	No-Action	No Impact	--	No Impact
	Action Alternatives	No Impact	--	No Impact
HAZ-8: Exposure of People or Structures to a Substantial Risk of Loss, Injury, or Death involving Wildland Fires	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
HAZ-9: Creation of a Substantial Hazard in Areas Designated by Airport Land Use Plans, within 2 miles of an Airport, or in the Vicinity of a Private Airstrip	No-Action	No Impact	--	No Impact
	Action Alternatives	No Impact	--	No Impact

Table S-3. Summary of Impacts and Mitigation Measures

IMPACTS	ALTERNATIVE	LEVEL OF SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES / CONSERVATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION / CONSERVATION MEASURE
HAZ-10: Impairment of the Implementation or Physical Interference with an Adopted Emergency Response or Emergency Evacuation Plan	No-Action	No Impact	--	No Impact
	Action Alternatives	No Impact	--	No Impact
RECREATION				
REC-1: Construction-Related Effects on Recreation Opportunities and Facilities	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	REC-1: Minimize Construction Effects on Recreation Uses	LTS
REC-2: Permanent Displacement of Existing Recreation Uses and Access Restrictions from Project Facilities	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	REC-2: Establish Boat Portage Facilities Around Project Facilities	LTS
REC-3: Effects on Recreational Angling at Project Structures	No-Action	LTS	--	LTS
	Action Alternatives	LTS	--	LTS
REC-4: Effects of Aquatic Habitat Improvements on Recreational Angling	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
REC-5: Effects of Increased Flows on Recreation Opportunities and Facilities	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
REC-6: Conflicts with Recreation Goals and Policies	No-Action	LTS	--	LTS
	Action Alternatives	LTS	--	LTS
SOCIOECONOMIC AND ECONOMICS				
ECON-1: Change in Agricultural Production Values	No-Action	LS	--	LS
	Action Alternatives	LS	--	LS
ECON-2: Effects on the Regional Economy from Changes in Agricultural Production	No-Action	LS	--	LS
	Action Alternatives	LS	--	LS
ECON-3: Effects on the Regional Economy from Construction and Operations and Maintenance Spending	No-Action	No Impact	--	No Impact
	Action Alternatives	Beneficial	--	Beneficial
ECON-4: Effects on Local Tax Revenues	No-Action	No Impact	--	No Impact
	Action Alternatives	LS	--	LS
ECON-5: Change in Population Growth and Housing Demand	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
ECON-6: Losses to the Lower San Joaquin Valley Levee District	No-Action	LS	--	LS
	Action Alternatives	LS	--	LS
TRANSPORTATION AND TRAFFIC				
TRA-1. Potential to Cause an Increase in Traffic which is	No-Action	No Impact	--	No Impact
	Action	LTS	--	LTS

Table S-3. Summary of Impacts and Mitigation Measures

IMPACTS	ALTERNATIVE	LEVEL OF SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES / CONSERVATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION / CONSERVATION MEASURE
Substantial in Relation to the Existing Traffic Load and Capacity of the Roadway System	Alternatives			
TRA-2. Potential to Exceed, Either Individually or Cumulatively, a LOS Standard Established by the County Congestion Management Agency for Designated Roads or Highways	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
TRA-3. Potential to Substantially Increase Hazards to a Design Feature or Increase Incompatible Uses	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
TRA-4. Potential to Result in Inadequate Emergency Access	No-Action	PSU	--	PSU
	A	PS	TRA-4A: Provide Temporary Roadway and Crossing at San Mateo Avenue	SU
	B	PS	TRA-4B: Use Construction Sequencing to Provide Continuous Emergency Access at Drive 10 ½	SU
	C	PS	TRA-4A: Provide Temporary Roadway and Crossing at San Mateo Avenue	SU
	D	PSU	--	PSU
UTILITIES AND SERVICE SYSTEMS				
UTL-1: Increased Need for New or Physically Altered Governmental Facilities due to Reduced Emergency Access and Increased Emergency Response Times	No-Action	LTS	--	LTS
	Action Alternatives	LTS	--	LTS
UTL-2: Potential For Generation of Solid Waste in the Project Area in Excess of Permitted Landfill Capacity	No-Action	No Impact	--	No Impact
	Action Alternatives	No Impact	--	No Impact
UTL-3: Potential For Noncompliance with Federal, State, and Local Statutes and Regulations Related to Solid Waste	No-Action	No Impact	--	No Impact
	Action Alternatives	No Impact	--	No Impact
UTL-4: Potential For Insufficient Water Supply Resources in the Project Area	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
UTL-5: Potential for New or Physically Altered Utility Infrastructure to Conflict With Any Applicable Land Use Plan, Policy, or Regulation	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
UTL-6: Effects on Energy	No-Action	No Impact	--	No Impact

Table S-3. Summary of Impacts and Mitigation Measures

IMPACTS	ALTERNATIVE	LEVEL OF SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES / CONSERVATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION / CONSERVATION MEASURE
Resources	Action Alternatives	LTS	--	LTS
UTL -7: Reduced Capacity of Existing Operational Diversion Facilities	No-Action	No Impact	--	No Impact
	Action Alternatives	LTS	--	LTS
VISUAL RESOURCES				
VIS-1: Construction Related Effects on the Visual Quality of the Project Site and Its Surroundings	No-Action	No impact	--	No impact
	Action Alternatives	PS	VIS-1: Minimize Visual Disruption from Construction Activities	LTS
VIS-2: Long-term Changes in the Visual Character or Quality of the San Mateo Avenue Crossing	No-Action	Beneficial	--	Beneficial
	Action Alternatives	Beneficial	--	Beneficial
VIS-3: Long-term Changes in the Visual Character or Quality of the Mendota Pool Park	No-Action	No impact	--	No impact
	A	No impact	--	No impact
	B	No impact	--	No impact
	C	LTS	--	LTS
	D	LTS	--	LTS
VIS-4: Long-term Changes in the Visual Character or Quality of the Mendota Dam Area	No-Action	No impact	--	No impact
	A	No impact	--	No impact
	B	No impact	--	No impact
	C	LTS	--	LTS
	D	LTS	--	LTS
VIS-5: Long-term Changes in the Visual Character or Quality of the Bass Avenue Residential Area	No-Action	No impact	--	No impact
	A	LTS	--	LTS
	B	LTS	--	LTS
	C	No impact	--	No impact
	D	No impact	--	No impact
VIS-6: Substantial Changes in Light or Glare	No-Action	No Impact	--	No Impact
	Action Alternatives	PS	VIS-6: Require Conformance to Lighting Standards	LTS

Key:

AAQS = Ambient Air Quality Standards
DWR = California Department of Water Resources
GHG = greenhouse gases
LOS = Level of Service
LS = less than substantial
LTS = less than significant
NHPA = National Historic Preservation Act
PS = potentially significant
PSU = potentially significant and unavoidable
SJVAPCD = San Joaquin Valley Air Pollution Control District
SU = significant and unavoidable
SWPPP = stormwater pollution prevention plan

Table S-4. Summary of Impacts for Environmental Justice

EFFECTS ON ENVIRONMENTAL JUSTICE COMMUNITIES OF CONCERN	ALTERNATIVE	DISPROPORTIONATELY HIGH AND ADVERSE EFFECTS ON MINORITY AND LOW-INCOME POPULATIONS
EJ-1: Removal of Land from Agricultural Production	No-Action	No
	Action Alternatives	Yes
EJ-2: Changes in Regional Activity Attributed to Agricultural Production	No-Action	No
	Action Alternatives	Yes
EJ-3: Changes in Regional Activity Attributed to Project Construction and Operations	No-Action	No
	Action Alternatives	No
EJ-4: Construction-related Emissions of Criteria Air Pollutants and Precursors and Exposure of Sensitive Receptors to Substantial Concentrations of Toxic Air Contaminants	No-Action	No
	Action Alternatives	Yes
EJ-5: Conflicts with Adopted Land Use Plans, Goals, Policies, and Ordinances	No-Action	No
	Action Alternatives	No
EJ-6: Conversion of Designated Farmland to Nonagricultural Uses and Cancellation of Williamson Act Contracts	No-Action	Yes
	Action Alternatives	Yes
EJ-7: Physical Impacts on Resources Used for Subsistence Consumption (Fish and Wildlife)	No-Action	No
	Action Alternatives	No
EJ-8: Reduced Inadequate or Emergency Access	No-Action	No
	Action Alternatives	No

Table S-5. Impacts of Action Alternatives with the Potential to Result in a Cumulatively Considerable Incremental Contribution to a Significant Cumulative Impact

RESOURCE AREA	IMPACT
Air Quality	Exposure of sensitive receptors to Project inputs and additional industrial sources, construction projects, and vehicles on roadways in the Project area.
Cultural Resources	Disturbance or Destruction of Cultural Resources
Environmental Justice	Regional economic factors that are adversely affecting minority and/or low-income populations
Land Use Planning and Agriculture	Conversion of designated Farmland to nonagricultural uses
Socioeconomics and Economics	Substantial short term economic impacts associated with losses in agricultural production
Transportation and Traffic	Temporary or permanent road closure(s) that could affect emergency access or emergency response times

SAN JOAQUIN RIVER
RESTORATION PROGRAM

1.0 Introduction

This Environmental Impact Statement/Report (EIS/R) documents the assessment of environmental effects of the implementation of the Mendota Pool Bypass and Reach 2B Improvements Project (Project), a component of Phase 1 of the overall San Joaquin River Restoration Program (SJRRP). The SJRRP was established in late 2006 to implement the Stipulation of Settlement (Settlement) in *Natural Resources Defense Council (NRDC), et al., v. Kirk Rodgers, et al*.

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation), as the Federal lead agency under the National Environmental Policy Act (NEPA), and the California State Lands Commission (CSLC), as the State of California (State) lead agency under the California Environmental Quality Act (CEQA), prepared this EIS/R for the Project. Federal authorization for implementing the Settlement is provided in the San Joaquin River Restoration Settlement Act (Act) (Public Law 111-11).

1.1 Background

Originating high in the Sierra Nevada Mountains, the San Joaquin River carries snowmelt from mountain meadows to the valley floor before turning north and becoming the backbone of tributaries draining into the San Joaquin Valley. The San Joaquin River is California's second longest river and discharges to the Sacramento-San Joaquin Delta (Delta) and, ultimately, to the Pacific Ocean through San Francisco Bay.

Historically, the San Joaquin River supported a rich and diverse ecosystem influenced by seasonal runoff patterns. During winter and spring months, runoff from Sierra Nevada streams would spread over the valley floor and slowly drain to the Delta, providing rich habitat supporting numerous aquatic and wildlife species, including Chinook salmon.

Over the past two centuries, development of water resources transformed the San Joaquin River. In the late 1880s, settlers in the Central Valley drained large areas of valley floor lands and put these lands into agricultural production, supported by small and seasonal diversion dams on the river and a series of water conveyance and drainage canals. Hydroelectric project development in the upper portions of the San Joaquin River watershed harnessed power from the river and modified the natural flow patterns.

In 1942, Reclamation completed construction of Friant Dam on the San Joaquin River. With the completion of Madera Canal in 1945 and Friant-Kern Canal in 1951, Friant Dam diverted San Joaquin River water supplies to over 1 million acres of highly productive farmland along the eastern portion of the San Joaquin Valley. Operation of the dam ceased flow in some portions of the river and contributed to the extirpation of salmon runs in the San Joaquin River upstream from the confluence with the Merced River.

1.1.1 Stipulation of Settlement

In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC) filed a lawsuit, known as *NRDC, et al., v. Kirk Rodgers, et al.*, challenging the renewal of long-term water service contracts between the United States and the Central Valley Project (CVP) Friant Division contractors. On September 13, 2006, after more than 18 years of litigation, the Settling Parties, including NRDC, Friant Water Authority (FWA), and the U.S. Departments of the Interior and Commerce, agreed on the terms and conditions of a Settlement subsequently approved by the U.S. Eastern District Court of California (Court) on October 23, 2006. Public Law 111-11, signed on March 30, 2009, authorizes and directs the Secretary of the Interior (Secretary) to implement the Settlement. The Settlement establishes two primary goals:

- **Restoration Goal** – To restore and maintain fish populations in "good condition" in the main stem San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.
- **Water Management Goal** – To reduce or avoid adverse water supply impacts on all of the Friant Division long-term contractors that may result from the Interim and Restoration flows provided for in the Settlement.

To achieve the Restoration Goal, the Settlement calls for releases of water from Friant Dam to the confluence of the Merced River (referred to as Interim and Restoration flows), a combination of channel and structural modifications along the San Joaquin River below Friant Dam, and reintroduction of Chinook salmon. Restoration Flows are specific volumes of water to be released from Friant Dam during different water year types, according to Exhibit B of the Settlement and began on January 1, 2014; Interim Flows were experimental flows that began in 2009 and continued until Restoration Flows were initiated, with the purpose of collecting relevant data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture, and reuse.

To achieve the Water Management Goal, the Settlement calls for recirculation, recapture, reuse, exchange or transfer of the Interim and Restoration flows to reduce or avoid impacts to water deliveries to all of the Friant Division long-term contractors caused by the Interim and Restoration flows. In addition, the Settlement establishes a Recovered Water Account (RWA) and program to make water available to all of the Friant Division long-term contractors who provide water to meet Interim or Restoration flows to reduce or avoid the impact of the Interim and Restoration flows on such contractors.

The Settlement and the Act authorize and direct specific physical and operational actions that could potentially directly or indirectly affect environmental conditions in the Central Valley. Areas potentially affected by Settlement actions include the San Joaquin River and associated flood bypass system, tributaries to the San Joaquin River, the Delta, and water service areas of the CVP and State Water Project (SWP), including the Friant Division. Settlement Paragraphs 11 through 16 describe physical and operational actions (see Table 1-1).

Table 1-1.
Restoration and Water Management Framework in Key Settlement Paragraphs

Settlement Paragraph	Description of Constraint or Assumption
11	Identifies specific channel and structural improvements considered necessary to achieve the Restoration Goal. Includes a reach-by-reach list of improvements.
12	Acknowledges that additional channel or structural improvements not identified in Paragraph 11 may be needed to achieve the Restoration Goal.
13	Identifies specific volumes of water to be released from Friant Dam during different year-types (Restoration Flows), and provisional water supplies to meet the Restoration Flow targets as provided in Exhibit B of the Settlement. Stipulates the release of Restoration Flows no later than January 1, 2014, subject to then-existing channel capacities.
14	Stipulates that spring-run and fall-run Chinook salmon be reintroduced to the San Joaquin River between Friant Dam and the confluence of the San Joaquin River with the Merced River no later than December 31, 2012, consistent with all applicable law and after commencement of sufficient flows and the issuance of all necessary permits. Assigns priority to wild spring-run Chinook salmon over fall-run Chinook salmon.
15	Specifies that Interim Flows begin no later than October 1, 2009, and continue until Restoration Flows can begin, to collect relevant data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture, and reuse.
16	Requires that the Secretary of the Interior develop and implement a plan for recirculation, recapture, reuse, exchange, or transfer of the Interim and Restoration flows to reduce or avoid impacts to water deliveries for all Friant Division long-term contractors. This paragraph also calls for establishment of an RWA and program to make water available to the Friant Division long-term contractors who provide water to meet Interim or Restoration flows.

Key:
RWA = Recovered Water Account

1.1.2 San Joaquin River Restoration Program

The SJRRP comprises several Federal and State agencies responsible for implementing the Settlement. Implementing Agencies include: Reclamation, U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), California Department of Water Resources (DWR), and California Department of Fish and Wildlife (DFW). In addition, the Settlement stipulates that a Technical Advisory Committee be established, comprising six members appointed by NRDC and FWA. The Settlement also calls for a Restoration Administrator (RA) to be appointed by NRDC and FWA, to facilitate the Technical Advisory Committee and provide specific recommendations to the Secretary in coordination with the Technical Advisory Committee. The RA's duties are defined in the Settlement, and include making recommendations to the Secretary on the release of Interim and Restoration flows. The RA is also responsible for consulting with the Secretary on implementing actions under Paragraph 11 of the Settlement, and for identifying and recommending additional actions under Paragraph 12 of the Settlement. In addition, the RA is responsible for consulting with the Secretary on the reintroduction of Chinook salmon under Paragraph 14 of the Settlement and flow releases under Paragraphs 13 and 15. The Secretary will diligently pursue completion of project-specific actions in consultation with the RA.

Exhibit C of the Settlement sets forth milestone dates for the purposes of implementing the Settlement. The Implementing Agencies acknowledge that some of the implementation, including this project, is unavoidably behind schedule and have developed a Draft Framework for Implementation with a revised schedule (SJRRP 2015).

1.1.3 Overview of the Mendota Pool Bypass and Reach 2B Improvements

The Project includes the construction, operation, and maintenance of the Mendota Pool Bypass and improvements in the San Joaquin River channel in Reach 2B (Figure 1-1). The Project consists of a floodplain width which conveys at least 4,500 cubic feet per second (cfs), a method to bypass Restoration Flows around Mendota Pool, and a method to deliver water to Mendota Pool. The Project footprint (Figure 1-2) extends from approximately 0.3 mile above the Chowchilla Bifurcation Structure to approximately 1.7 miles below the Mendota Dam. The Project footprint comprises the area that could be directly affected by the Project. The Project may also indirectly affect nearby portions of Reach 2A and Reach 3. The Project study area or "Project area" includes areas directly and indirectly affected by the Project. The Project area is in Fresno and Madera counties, near the town of Mendota, California.

The Mendota Pool Bypass and Reach 2B improvements defined in the Settlement are (Settlement Paragraph 11[a]):

> *(1) Creation of a bypass channel around Mendota Pool to ensure conveyance of at least 4,500 cfs from Reach 2B downstream to Reach 3. This improvement requires construction of a structure capable of directing flow down the bypass and allowing the Secretary to make deliveries of San Joaquin River water into Mendota Pool when necessary;*
>
> *(2) Modifications in channel capacity (incorporating new floodplain and related riparian habitat) to ensure conveyance of at least 4,500 cfs in Reach 2B between the Chowchilla Bifurcation Structure and the new Mendota Pool bypass channel.*

Because the functions of these channels may be inter-related, the design, environmental compliance, and construction of the two are being addressed as one project. The Project would be implemented consistent with the Settlement and the Act, with implementation dates clarified by the Implementation Framework (SJRRP 2015).

The Mendota Pool Bypass would include conveyance of at least 4,500 cfs around Mendota Pool (or the Pool) from Reach 2B to Reach 3 and a fish barrier, if appropriate, to direct upmigrating adult salmon into the bypass. The bypass could be accomplished by constructing a new channel around Mendota Pool or by limiting Mendota Pool to areas outside of the San Joaquin River. This action would include the ability to divert 2,500 cfs to the Pool if water deliveries are required for the San Joaquin River Exchange Contractors (Exchange Contractors) and may consist of a bifurcation structure in Reach 2B. The bifurcation structure would include a fish passage facility to enable up-migrating salmon to pass the structure and a fish screen, if appropriate, to direct out-migrating fish into the bypass channel and minimize or avoid fish entrainment to the Pool.

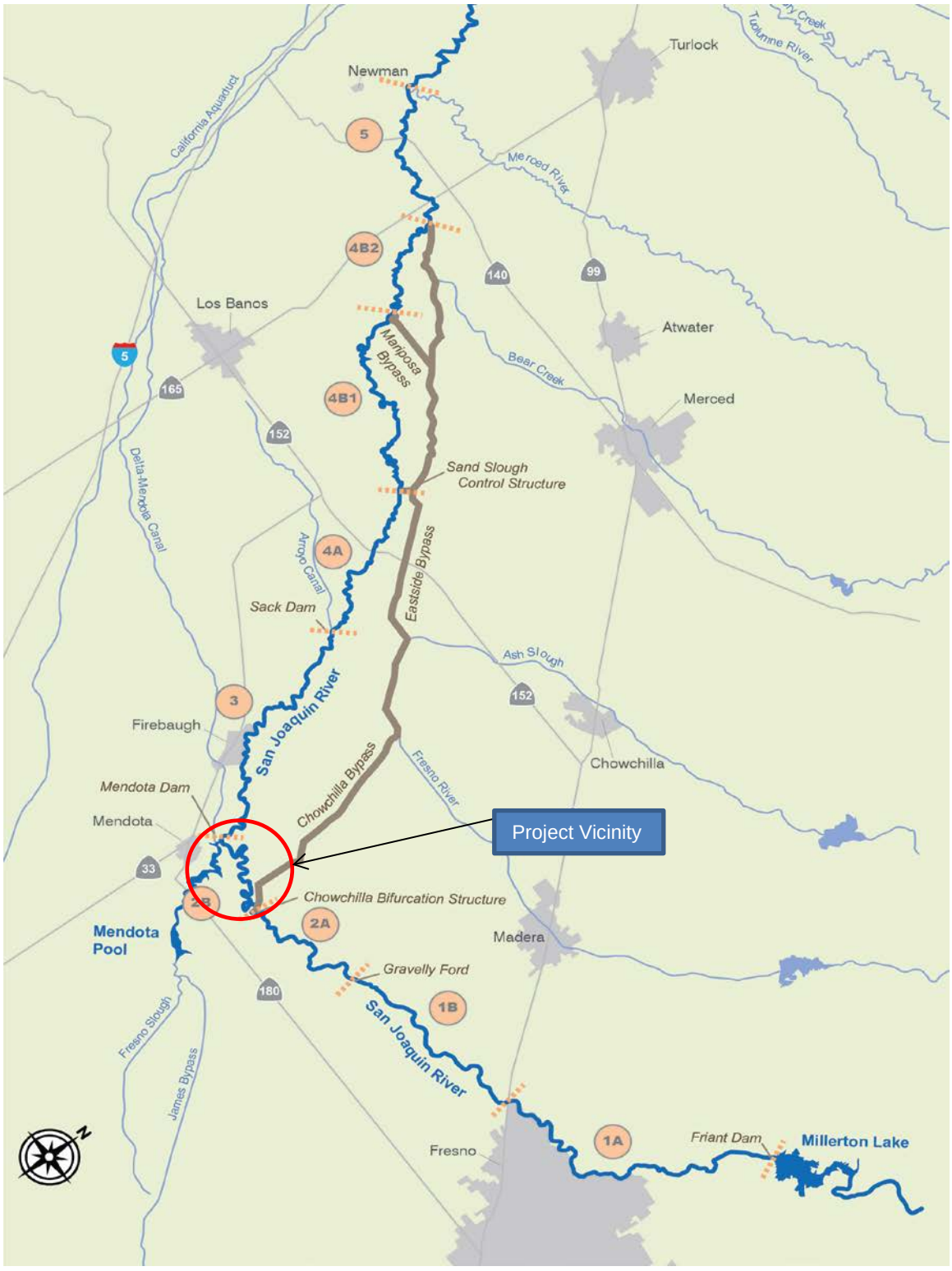


Figure 1-1.
Overview of the SJRRP Restoration Area and the Project Vicinity

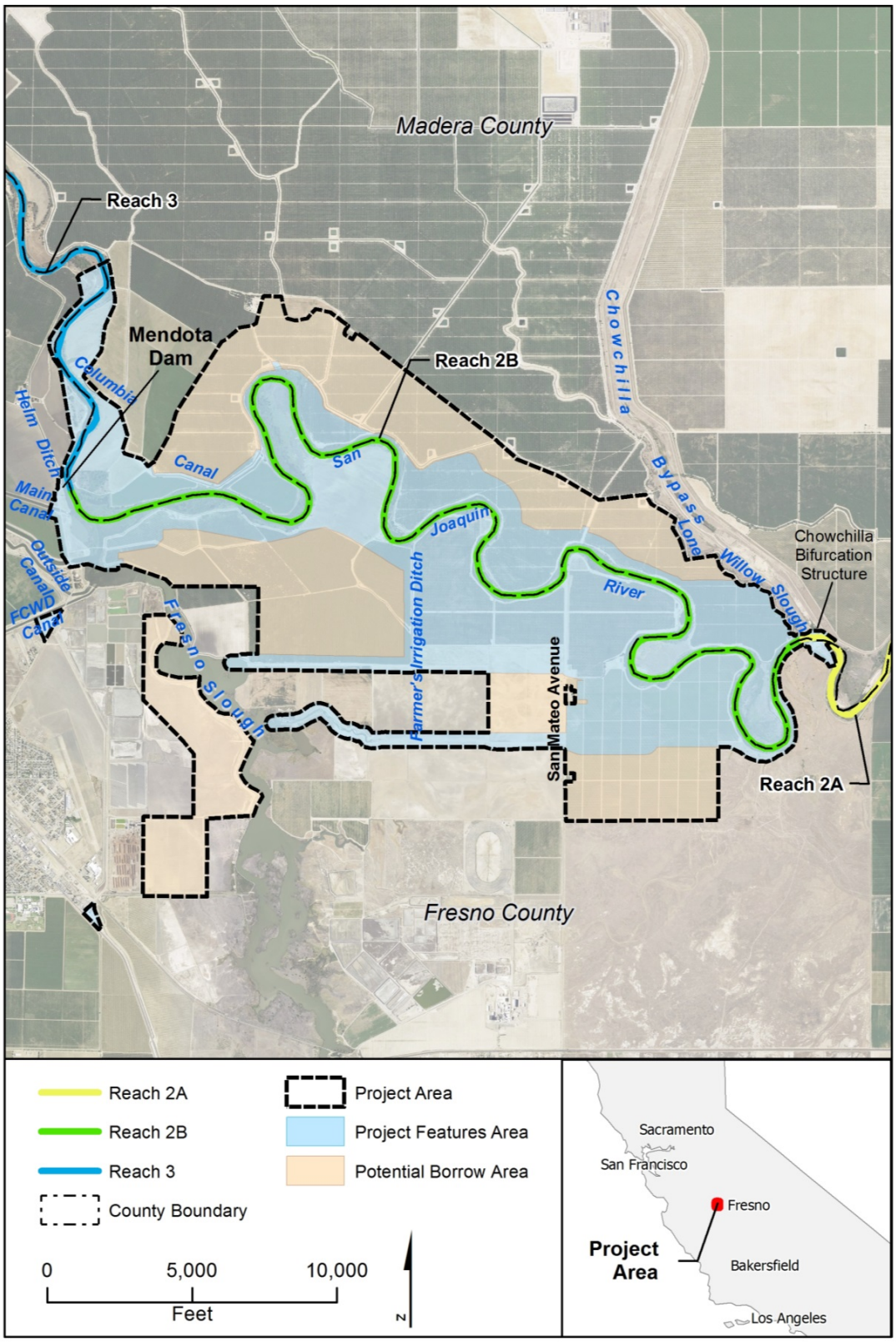


Figure 1-2.
Project Footprint and Vicinity

Improvements to Reach 2B would include modifications to the San Joaquin River channel from the Chowchilla Bifurcation Structure to the new Mendota Pool Bypass to provide a capacity of at least 4,500 cfs with integrated floodplain habitat. The options under consideration include potential levee setbacks along Reach 2B to increase the channel and floodplain capacity and provide for floodplain habitat. Floodplain habitat is included along the Reach 2B portion of the Project as required by the Settlement; floodplain habitat is being considered along the Mendota Pool Bypass channel because Central Valley floodplains have been shown to be of value to rearing juvenile salmon as they migrate downstream (Jeffres 2008, Grosholz 2006, Sommer 2004, Sommer 2001). In addition, the SJRRP *Fisheries Management Plan* (SJRRP 2010a) and *Minimum Floodplain Habitat Area for Spring and Fall-Run Chinook Salmon* report (SJRRP 2012a) describe that sufficient floodplain habitat is an important feature for meeting salmon population targets.

Improvements included in the project could potentially be implemented in a phased approach to facilitate scheduling and funding. Phased implementation is discussed further in Section 2.2.4.

1.1.4 Scoping and Public Involvement Process

The lead agencies conducted public and stakeholder outreach activities to engage and inform all interested parties of Project activities. Engaging those interested parties helped to inform the process for scoping the Project alternatives and development of this EIS/R. Reclamation initiated the NEPA process by issuing a Notice of Intent (NOI) on July 13, 2009, and DWR initiated the CEQA process by issuing a Notice of Preparation (NOP) on the same day, to prepare an EIS/R and hold public scoping meetings. (Although initial CEQA actions were conducted by DWR, subsequent actions during the EIS/R process have been conducted by the CSLC as the State lead agency.)

The EIS/R scoping comment period began the date the NOI was issued and ended on August 14, 2009. The Implementing Agencies convened two public meetings, one each in Fresno (July 28, 2009) and Firebaugh (July 29, 2009), to inform the public and interested stakeholders about the Project, and to solicit comments and input on the scope of the EIS/R. Reclamation and DWR received comments from 29 entities, including Federal and State agencies, local interest groups, local residents, farmers, landowners, public advocacy groups, and individuals. The comments received were summarized in a Public Scoping Report released February 2010 (SJRRP 2010b). The NEPA scoping process also serves as the scoping process for compliance with other Federal laws such as the National Historic Preservation Act, Section 106.

Public involvement and outreach activities have enabled the Implementing Agencies to involve stakeholders and incorporate public and stakeholder input into the development of major Project documents, including this EIS/R. These activities seek to create an open and transparent process through which the general public, stakeholders, affected Third Parties, and other interested parties can track and participate in SJRRP activities, including the formulation of alternatives for this EIS/R. Ongoing public outreach activities conducted in support of the Project include the following:

- Hosting Project-specific landowner meetings as well as participating in SJRRP Technical Feedback Meetings with subject-matter experts, Settling Parties, affected stakeholders, and the general public to obtain information and viewpoints from individual attendees; provide updates on the status of Project work products; keep the Technical Feedback Group up-to-date with the current status of the Project; gather feedback on Project documents; and discuss potential opportunities and constraints that may arise. The format of obtaining and disseminating information through the landowner meetings and Technical Feedback Group meetings is intended to be flexible to address the issues and documents at hand and to accommodate the needs of the SJRRP, Settling Parties, stakeholders, and the general public.
- Making available technical memoranda and other milestone Project documents to the general public, stakeholders, affected Third Parties, and other interested parties on the SJRRP website.

The lead agency must, whenever practicable, use a consensus-based management approach to the NEPA process, as required by 43 Code of Federal Regulations (CFR) 46.110. Consensus-based management "involves outreach to persons, organizations or communities who may be interested in or affected by a proposed action with an assurance that their input will be given consideration by the Responsible Official in selecting a course of action" (43 CFR 46.110 (a)). This EIS/R was developed with a consensus-based management approach. The completed and ongoing activities conducted in support of the Project, as described above, constitute outreach performed in support of this approach.

1.2 Purpose and Uses of this EIS/R

The purpose of this EIS/R is to analyze the project-specific direct, indirect, and short-term/long-term impacts of implementing the Project as directed by the Act, consistent with NEPA/CEQA requirements. This EIS/R serves as an informational document for decision makers, public agencies, non-government organizations, and the general public regarding the potential direct and indirect environmental consequences of implementing any of the alternatives. Consistent with CEQ Regulations, 40 CFR Part 46.425, and State CEQA Guidelines, Alternative B has been identified as the preferred alternative. No sooner than 30 days after the Final EIS/R is published, Reclamation will prepare a Record of Decision (ROD). Similarly, CSLC will take actions on whether to certify the EIR, approve a project, and file a Notice of Determination (NOD).

1.2.1 National Environmental Policy Act

NEPA provides an interdisciplinary framework for Federal agencies to take environmental factors into account during a decision making process (42 United States Code [USC] 4321, 40 CFR 1500.1). NEPA requires an Environmental Impact Statement (EIS) whenever a proposed major Federal action (e.g., a proposal for legislation or an activity financed, assisted, conducted, or approved by a Federal agency with Federal agency control) significantly affects the quality of the human environment. Section

1508.14 of the CEQ Regulations defines the human environment to include "the natural and physical environment and the relationship of people with that environment."

The EIS, in conjunction with other relevant material, is used by the Federal Government to plan actions and make decisions. Section 1502.1 of the CEQ Regulations states that the primary purpose of an EIS is to serve as an action-forcing device to insure that the policies and goals defined in NEPA are infused into the ongoing programs and actions of the Federal Government. As an informational document, an EIS provides a rigorous and objective evaluation of all reasonable alternatives; full and open disclosure of environmental consequences before agency action; an interdisciplinary approach to project evaluation; identification of measures to mitigate impacts; and an avenue for public and agency participation in decision making. NEPA defines mitigation as avoiding, minimizing, rectifying, reducing or eliminating, or compensating for an action (40 CFR 1508.20). NEPA also requires evaluating a proposed action and alternatives at an equal level of analysis.

NEPA requires that a lead agency "include [in an EIS] appropriate mitigation measures not already included in the proposed action or alternatives" (40 CFR 1502.14(f)). An EIS must also include discussions of "means to mitigate adverse environmental impacts (if not fully covered under § 1502.14(f))" (40 CFR 1502.16(h)). In preparing a ROD under 40 CFR 1505.2, a lead agency must "[s]tate whether all practicable means to avoid or minimize environmental harm from the alternative selected have been adopted, and if not, why they were not. A monitoring and enforcement program shall be adopted and summarized where applicable for any mitigation."

1.2.2 California Environmental Quality Act

The State CEQA Guidelines (Cal. Code Regs., tit. 14, § 15064, subd. (f)(1)) require that an EIR be prepared whenever a project may have a significant effect on the environment. Section 15064, subdivision (d) states that "[i]n evaluating the significance of the environmental effect of a project, the lead agency shall consider direct physical changes in the environment which may be caused by the project and reasonably foreseeable indirect physical changes in the environment which may be caused by the project." An EIR is an informational document used to inform public agency decision makers and the general public of the significant environmental effects of a project, identify possible ways to mitigate or avoid the significant effects, and describe a range of reasonable alternatives to the project that could feasibly attain most of the basic objectives of the project while substantially lessening or avoiding any of the significant environmental impacts. When determining whether to approve a project, State and local public agencies are required by CEQA to consider the information presented in the EIR.

State CEQA Guidelines section 15126.6, subdivision (a) also requires that an EIR "describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." A range of reasonable alternatives is analyzed to define issues and provide a clear basis for choice among options. CEQA requires that the lead agency consider alternatives that would avoid or reduce one or more of the

significant impacts identified for a project in an EIR. The State CEQA Guidelines state that the range of alternatives required to be evaluated in an EIR is governed by a "rule of reason;" the EIR needs to set forth only those alternatives necessary to permit a reasoned choice and to select and discuss them in a manner to foster meaningful public participation and informed decision making (§ 15126.6, subd. (f)). Consideration of alternatives focuses on those which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly (§ 15126.6, subd (b)). CEQA does not require alternatives to be evaluated in the same level of detail as the proposed project.

CEQA requires that State and local government agencies consider the potential environmental effects of projects over which they have discretionary authority before taking action on those projects (Pub. Resources Code, § 21000 et seq.). CEQA also requires that each public agency avoid or mitigate to less-than-significant levels, wherever feasible, the significant environmental effects of projects it approves or implements. The significant environmental impacts are addressed in written findings that are supported by substantial evidence in the record (State CEQA Guidelines, § 15091). If a project would result in significant and unavoidable environmental impacts that cannot be feasibly mitigated to less-than-significant levels, the project can still be approved, but the lead agency's decision makers must make a "statement of overriding considerations" explaining in writing the specific economic, legal, social, technological, or other considerations that they conclude, based on substantial evidence, make those significant effects "acceptable" (State CEQA Guidelines, § 15093).

1.2.3 Type of Environmental Document

Program-level actions (and some project level actions) were analyzed in the Program Environmental Impact Statement/Environmental Impact Report (PEIS/R) (SJRRP 2011a). The program-level, or first-tier, analysis was performed in accordance with CEQ Regulations (40 CFR 1502.20), and consistent with California Public Resources Code sections 21093 and 21094; California Code of Regulations, Title 14, sections 15152 and 15168; and 40 CFR 1500.4(i), 1502.4(b), and 1502.20, among others. The program-level analysis has considered broad environmental effects of implementing the Settlement and has identified mitigation measures and performance standards that apply to project-level actions implemented as part of the Settlement.

Project-level analyses, such as this EIS/R which analyzes a portion of the Program area, can incorporate the findings of the PEIS/R by reference through "tiering," or incorporating by reference general discussions from the PEIS/R. Incorporation of previous analysis by reference is encouraged for NEPA analysis under the CEQ Regulations (40 CFR §§ 1500.4 and 1502.21).

> *Agencies shall incorporate material into an environmental impact statement by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. The incorporated material shall be cited in the statement and its content briefly described. No material may be incorporated by reference*

> *unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment. Material based on proprietary data which is itself not available for review and comment shall not be incorporated by reference (§ 1502.21).*

The State CEQA Guidelines also allow for incorporation by reference when project-specific analysis is tiered from previous analysis (§§ 15150 and 15152).

This EIS/R presents project-level analyses of the actions described in each alternative (see Chapter 2, "Description of Alternatives"). Other potential actions considered for evaluation but not included in the Action Alternatives (described in the Project Description Technical Memorandum, Attachment A, "Alternatives Evaluation" (SJRRP 2012b)) are not prohibited from future implementation, but would require separate analysis pursuant to NEPA and/or CEQA at a project level of detail.

1.2.4 Compliance and Permits Supported by this EIS/R

The SJRRP will obtain all necessary permits, as required by law. This EIS/R supports the needed permits, petitions, and similar compliance, coordination, and consultation efforts for the Project actions. Permits that may be required are shown in Table 1-2 and described in Chapter 27.0, "Consultation, Coordination, and Compliance."

Table 1-2.
Compliance, Consultation, and Coordination to Be Supported by this EIS/R

Resource Applicable	Laws/Regulations/Permits	Regulating Agency/Agencies
All	San Joaquin River Restoration Settlement Act	Secretary of the Interior
Wetlands and Waters of the United States	Section 10 of the Rivers and Harbors Act – Individual or General Permit	U.S. Army Corps of Engineers
	Section 401 of the Clean Water Act – Water Quality Certification or Waiver	Regional Water Quality Control Board
	Section 402 of the Clean Water Act – National Pollutant Discharge Elimination System permit(s)	State Water Resources Control Board and Regional Water Quality Control Board
	Section 404 of the Clean Water Act – Individual or General Permit	U.S. Army Corps of Engineers
Federally Listed Species	Section 7 of the Federal Endangered Species Act – Section 7 Consultation	U.S. Fish and Wildlife Service and National Marine Fisheries Service
Fish and Wildlife Resources	Magnuson-Stevens Fishery Conservation and Management Act	National Marine Fisheries Service
	Fish and Wildlife Coordination Act report	U.S. Fish and Wildlife Service
	Migratory Bird Treaty Act	U.S. Fish and Wildlife Service
	Bald and Golden Eagle Protection Act	U.S. Fish and Wildlife Service

Table 1-2.
Compliance, Consultation, and Coordination to Be Supported by this EIS/R

Resource Applicable	Laws/Regulations/Permits	Regulating Agency/Agencies
Cultural Resources	National Historic Preservation Act – Section 106 Consultation	State Office of Historic Preservation
Levees and Floodways	Section 14 of the Rivers and Harbors Act ("Section 408") – Permission	U.S. Army Corps of Engineers
	33 Code of Federal Regulations 208.10	U.S. Army Corps of Engineers
Bridges	Section 9 of the Rivers and Harbors Act and General Bridge Act of 1946 permit	U.S. Coast Guard
Water Rights	California Water Code – Water Right Petitions (including petitions for changes to Water Right Permits 11885, 11886, and 11887)	State Water Resources Control Board
State Lands	Land Use Lease	California State Lands Commission
Air Quality	Authority to Construct, Permit to Operate	San Joaquin Valley Air Pollution Control District
State-Owned Roadways	Encroachment Permit	California Department of Transportation

1.3 Relationship to Other SJRRP NEPA and CEQA Documents

Several environmental documents have been prepared previously to facilitate early actions needed to implement the Settlement. Documents include, but are not limited to, the following:

- *Water Year 2010 Interim Flows Project Final Environmental Assessment/Finding of No Significant Impact (EA/FONSI) and Initial Study/Mitigated Negative Declaration (IS/MND)* (SJRRP 2009).
- *Interim Flows Project – Water Year 2011 Supplemental EA/FONSI* (Reclamation 2010).
- *Draft PEIS/R* (SJRRP 2011a).
- *Interim Flows Project – Water Year 2012 Final Supplemental EA/FONSI* (SJRRP 2011b).
- *Mendota Dam Sluice Gates Replacement Project, Final EA/FONSI* (SJRRP 2011c).
- *Recirculation of Recaptured Water Year 2011 San Joaquin River Restoration Program Interim Flows EA/FONSI* (Reclamation 2011).
- *Final PEIS/R* (SJRRP 2012c).

- *Invasive Vegetation Monitoring and Management Final EA/FONSI* (SJRRP 2012d).
- *PEIS/R Record of Decision* (SJRRP 2012e).
- *2014 SJRRP Juvenile Fall-Run Chinook Salmon Trap and Haul Study* (Reclamation 2014).
- *SJRRP: Salmon Conservation and Research Facility and Related Management Actions Project* (DFW 2014).

1.4 Purpose and Need for Action and Project Objectives

NEPA regulations require a statement of "the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action" (40 CFR 1502.13). The State CEQA Guidelines require a clearly written statement of objectives, including the underlying purpose of a project (State CEQA Guidelines, § 15124, subd. (b)).

The purpose and objective of the Project are to implement portions of the Settlement consistent with the Act. The Act authorizes and directs the Secretary to implement the Settlement. Specifically, this Project is intended to implement Paragraphs 11(a)(1) and 11(a)(2) of the Settlement, which are authorized in Section 10004(a)(1) of the Act.

Paragraph 11(a)(1)

> *Creation of a bypass channel around Mendota Pool to ensure conveyance of at least 4,500 cfs from Reach 2B downstream to Reach 3. This improvement requires construction of a structure capable of directing flow down the bypass and allowing the Secretary to make deliveries of San Joaquin River water into Mendota Pool when necessary;*

Paragraph 11(a)(2)

> *Modifications in channel capacity (incorporating new floodplain and related riparian habitat) to ensure conveyance of at least 4,500 cfs in Reach 2B between the Chowchilla Bifurcation Structure and the new Mendota Pool bypass Channel;*

The Settlement specifies the need, which requires modifications to Reach 2B and construction of a bypass around Mendota Pool in support of achieving the Restoration Goal (Settlement Paragraph 2):

> *… a goal of this Settlement is to restore and maintain fish populations in "good condition" in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including*

naturally-reproducing and self-sustaining populations of salmon and other fish (the "Restoration Goal").

The purpose to provide increased capacity and floodplain and riparian habitat in Reach 2B respond to the need to restore and maintain fish populations in "good condition" by providing fish passage and rearing habitat which benefit salmon and other native fish. Without the Project in Reach 2B, restoration activities would be unlikely to achieve the Settlement goals.

1.5 Responsibilities of Lead Agencies, Responsible Agency, and Implementing Agencies

As previously described, Reclamation is the lead NEPA agency and CSLC is the lead CEQA agency in preparing this EIS/R. The actions identified in this EIS/R include actions to be undertaken by Reclamation and CSLC. The effects of these actions are identified in this EIS/R.

The Settlement identifies the Secretary as the lead Federal entity responsible for implementation and USFWS as the lead Federal agency responsible for reintroduction of spring-run and fall-run Chinook salmon. The Secretary has designated Reclamation to act as the lead Federal entity responsible for implementation of the Settlement. The Settlement also identifies the Secretary of the U.S. Department of Commerce, through NMFS, as a necessary participant to allow for permitting the reintroduction of spring-run Chinook salmon. The Settlement also anticipated involvement of the California Natural Resources Agency through DWR and DFW. Therefore, the Implementing Agencies include Reclamation, USFWS, NMFS, DWR, and DFW.

Reclamation and CSLC have coordinated with the Settling Parties and Implementing Agencies in preparation of this EIS/R. In addition, several agencies accepted the invitation to participate as cooperating agencies under NEPA, including the U.S. Environmental Protection Agency (EPA), the U.S. Army Corps of Engineers (Corps), NMFS, and Central California Irrigation District. The cooperating agencies have provided input that is being considered in preparation of this EIS/R.

Additional information on responsible agencies and permit requirements is provided in Chapter 27.0, "Consultation, Coordination, and Compliance."

1.6 Project Study Area

1.6.1 Geographic Area Description

The Project study area or "Project area" includes areas that may be affected directly or indirectly by the Project alternatives. The Project footprint (township 13S, range 15E), shown in Figure 1-2, has two major components: Reach 2B and the Mendota Pool Bypass. Reach 2B generally includes the area from the San Joaquin River Control Structure near the Chowchilla Bypass downstream to Mendota Dam. Potential Project

improvements in Reach 2B, which vary by alternative, extend from the Chowchilla Bifurcation Structure on the upstream end to the head of the potential Mendota Pool Bypass channel or to Mendota Dam on the downstream end. However, Reach 2B improvements may also include areas just upstream of the Chowchilla Bifurcation Structure and may continue downstream of the head of the Mendota Pool Bypass or Mendota Dam, including the Pool area, as necessary to meet Project goals and objectives. The lateral extent of potential Project Reach 2B improvements, which varies by alternative, includes lands to the north and south of the San Joaquin River in Reach 2B.

The Mendota Pool Bypass element of the Project alternatives generally includes the area from the downstream end of the Reach 2B improvements to a tie-in location in Reach 3. Improvements for the Mendota Pool Bypass, which vary by alternative, extend from the area south of Mowry Bridge over Fresno Slough to the area north of Mendota Dam where the Bypass ties into Reach 3. The Mendota Pool Bypass element of the Project alternatives also includes areas adjacent to and on the west side of Mendota Pool and Fresno Slough and areas to the south of the potential Project Reach 2B improvements. Areas indirectly affected by this Project include portions of Reach 3 downstream and Reach 2A upstream that are outside the direct Project footprint.

The Project area reflects current estimates of areas that may be affected by the Project alternatives. In this EIS/R, the area where direct and indirect effects may occur differs according to resource area; therefore, the geographic range and environmental conditions described herein vary by resource.

1.6.2 Description of Existing Conditions within the Study Area

At the upstream end of the Project, the Chowchilla Bifurcation Structure is used to control and route flood releases from Friant Dam and the upstream watershed into Reach 2B and the Chowchilla Bypass, a flood protection project on the San Joaquin River. Under no-flow conditions, plunge pools (approximately 7 feet deep and 10 feet deep, respectively) can be observed at the downstream base of the Chowchilla Bifurcation Structure in both the San Joaquin River and the Chowchilla Bypass.

Reach 2B ends on the downstream end at the Mendota Dam, which creates Mendota Pool. The Delta-Mendota Canal terminates at the Pool, which distributes water deliveries from the Delta to Exchange Contractors via the Main Canal, Helm Ditch, Columbia Canal, Main Lift Canal, and Outside Canal. The Pool is shallow with little storage volume, and the pool elevation is maintained for the purposes of hydraulic head into Fresno Slough. The Pool provides only minimal transitory storage above the operating elevation and, therefore, does not provide substantial flood control protection. During flood releases, the flashboards are removed at Mendota Dam allowing the backwatered Pool to become part of the flowing river.

Flood flows through Mendota Pool are released from Friant Dam, Pine Flat Dam, or both. Friant Dam flood control releases may be diverted into Reach 2B at the Chowchilla Bifurcation Structure, and Pine Flat Dam flood control releases may be diverted into Mendota Pool via the James Bypass and Fresno Slough. Pine Flat Dam flood control releases have priority over Friant Dam flood control releases, so depending on the

available capacity in Reach 3, a portion or all of the flow from Reach 2A may be diverted into the Chowchilla Bypass. Pine Flat Dam flood control releases into Mendota Pool occur in wet years (approximately 1 in 5 years with the SJRRP). Accordingly during wet years, flow in Reach 2B may be reduced during flood control releases from Pine Flat Dam.

The Project area includes only one existing private crossing, a dip-crossing at San Mateo Avenue, consisting of a culvert to convey low flows and an earthen embankment supporting the roadbed, which is overtopped during higher flows.

The San Mateo Avenue crossing is the approximate limit of the backwater effects of the Pool. Downstream of San Mateo Avenue, the river channel is inundated as a result of the Pool water surface elevation. Upstream of the crossing, the channel is only wetted during Interim Flows or flood releases from Friant Dam. The Pool and associated river channel were drained approximately every 2 years to inspect and perform maintenance on Mendota Dam. Recent repairs at Mendota Dam have reduced this need to dewater the Pool for dam inspections.

Several water diversions (including Lone Willow Slough and the Columbia Canal), canals, lift stations, and groundwater wells exist within the Project area. Additionally, electrical and gas distribution lines and water pipelines lie within the Project area.

Existing Land Use and Habitat

A narrow corridor of riparian and aquatic habitat exists along the river corridor, levees, and at Mendota Pool; otherwise, land use within and surrounding the Project area is primarily agriculture with the exception of the water management facilities at the Pool.

The Pool backwater supports perennial riparian vegetation, predominantly willow riparian and cottonwood riparian forest communities with emergent wetland communities. Upstream of San Mateo Avenue and prior to Interim Flows, the channel exhibited a sandy substrate with little to no in-channel vegetation (Figure 1-3). Existing vegetation along the banks of the channel in these areas consists predominantly of riparian scrub and willow scrub communities.

Existing Fish Population and Habitat Conditions

Prior to the start of Interim Flows in October 2009, Reach 2B upstream of San Mateo Avenue was dry except during flood flows (approximate frequency was every 2 to 3 years), consequently there was very limited in-channel habitat features. The Pool contained mostly introduced fishes and a few native fish. The biennial dewatering of the Pool left the Pool site mostly dry, but some locations held standing water during the several week period the Pool was drained in mid-winter.

Figure 1-3.
Reach 2B Channel without Interim Flows (12/15/09)

The Reach 2B channel bed is composed of unconsolidated fine sand and, prior to Interim Flows, there was little definition of the channel bed, which is typical for sand bed systems. No pool-bar structure or bed features occurred which would typically be used in gravel bed or coarser systems to classify and evaluate fish habitat features (pools, riffles, runs) or conditions (instream cover, overhead cover, etc.). Aquatic habitat in Reach 2B upstream of San Mateo Avenue was limited because there is a long history of the channel being dry prior to the start of Interim Flows. Riparian vegetation was limited to the levees along the channel banks. In the lower portion of Reach 2B, the channel was defined where vegetation had been established along the backwatered portion from the Pool between Mendota Dam and San Mateo Avenue. The Pool was bordered by emergent, wetland and riparian vegetation including mature cottonwood trees. Aquatic habitat in this section of river was affected by the backwatering of Mendota Dam and sedimentation in the Pool.

Since the start of Interim and Restoration flows, Reach 2B has increased inundation and establishment of hydrophilic vegetation. Aquatic habitat between the Chowchilla Bifurcation Structure and San Mateo Avenue has developed into a series of low gradient riffles, flatwater glides, and mid-channel pools and the San Joaquin River arm of Mendota Pool continues to hold water year-round. With the exception of biennial dewatering, Pool elevations are maintained near capacity.

Existing Structures

Chowchilla Bifurcation Structure

The most upstream structure is the Chowchilla Bifurcation Structure (Figure 1-2 and Figure 1-4). This structure is used to route flood flows down the Chowchilla Bypass. The bifurcation has two structural components: the river control structure, which spans the

San Joaquin River, and the bypass control structure, located at the head of the Chowchilla Bypass. The bifurcation structure has wingwalls bounding four gated bays on each channel. The bays are essentially 20-foot-wide by 18-foot-high box culverts containing a trash rack on the upstream side (Figure 1-5). The four bays discharge across a row of energy dissipaters (dragons teeth) then over a concrete slab that is bounded on the downstream end by a 2-foot-high concrete weir. Immediately below the concrete weir is a row of riprap sitting against the concrete weir and above the sand bed of Reach 2B (Figure 1-6). Upstream and downstream of the structure is the sand bed of Reach 2A and 2B, respectively.

San Mateo Avenue Crossing

The present crossing of Reach 2B is a dip crossing or low-water crossing (Figure 1-7, Figure 1-8). Flows less than approximately 150 cfs are routed through a culvert beneath the road. At flows above approximately 150 cfs, the road is inundated (Houk 2009). The north (Madera County) portion of the crossing is within public right-of-way, but the south (Fresno County) portion of the crossing is on private land, essentially rendering it a private river crossing.

Mendota Dam and Mendota Pool

Mendota Dam (Figure 1-2 and Figure 1-9), at the downstream end of Reach 2B, forms a pool approximately 7 miles long to San Mateo Avenue. The downstream 2 to 3 miles of the channel is bordered by mature trees along the north bank. Typically, the Pool receives water from the Delta-Mendota Canal which supplies water to the Helm Ditch, Main Canal, Outside Canal, Main Lift Canal, Fresno Slough, and Columbia Canal. The Pool is shallow and was drained about every 2 years for dam inspection and maintenance. Recent repairs at Mendota Dam have reduced this need to dewater the Pool for dam inspections.

Figure 1-4.
View from downstream of the Chowchilla Bifurcation Structure in Reach 2B (12/15/09)

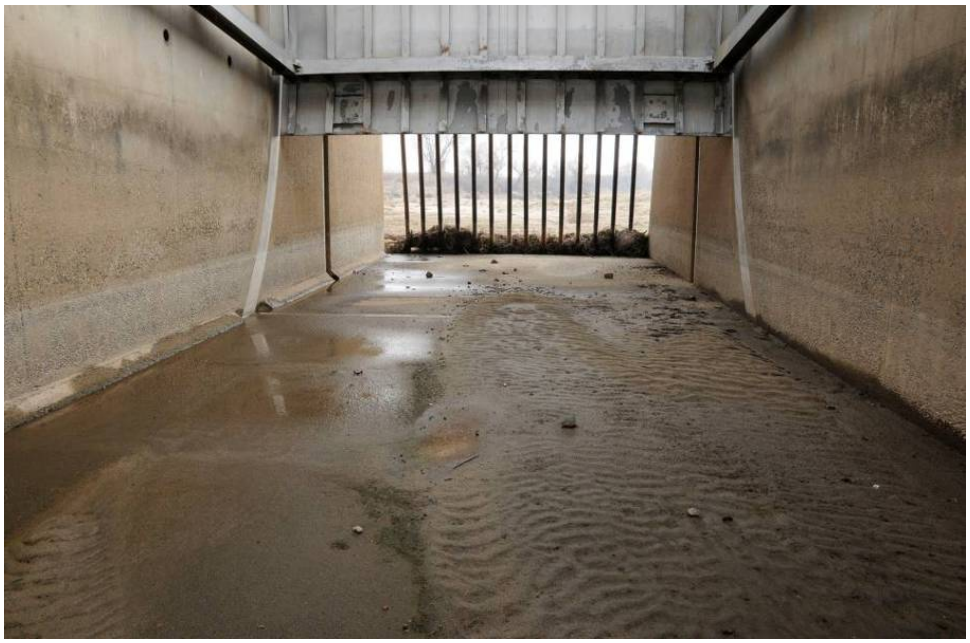


Figure 1-5.
Inside of one of the bays at the Chowchilla Bifurcation Structure[1] (12/15/09)

Figure 1-6.
Concrete sill and bordering riprap along the downstream edge of the Chowchilla Bifurcation Structure in Reach 2B[2] (12/15/09)

[1] Ponded water shown in Figure 1-5 is the remains of the 2009 fall Interim Flows.
[2] Ponded water shown in Figure 1-6 is the remains of the 2009 fall Interim Flows.

Figure 1-7.
San Mateo Avenue Crossing of Reach 2B looking from north bank to south bank (12/15/09)

Figure 1-8.
San Mateo Avenue crossing of Reach 2B showing single culvert beneath the road (12/15/09)

Figure 1-9.
Downstream face of Mendota Dam (5/28/09)

1.6.3 Description of Local Hydrology

As part of the SJRRP, Restoration Flows are released from Friant Dam based on water year type and other factors, as described in the *Restoration Flow Guidelines* (SJRRP 2013), and conveyed to Reach 2B (see Figure 1-10). Flows conveyed into or diverted from Reach 2B and the Mendota Pool include:

- Restoration (and Interim flows prior to 1/1/2014).
- Exchange Contractor deliveries to Mendota Pool from the San Joaquin River.
- Exchange Contractor deliveries to Mendota Pool from the Delta-Mendota Canal.
- Millerton Lake flood releases.
- Pine Flat Reservoir flood releases.
- Diversions to Mendota Pool via groundwater pump-ins.
- Diversions from Mendota Pool via the Columbia Canal, Mendota Dam (for Arroyo Canal in Reach 3), Helm Ditch, Main Canal, Outside Canal, Fresno County Waterworks District Canal, Fresno Slough, and Mowry pumps.
- Diversions from the river via Lone Willow Slough and other pumps for riparian rights diversions.

There are three basic flow scenarios involving Restoration Flows, flood flows, and water deliveries that would typically occur in Reach 2B:

- Restoration Flows would proceed through Reach 2B and irrigation deliveries and diversions would occur in Mendota Pool with no interaction between the Restoration Flows in Reach 2B and Mendota Pool. This would typically occur in critical-low to normal-wet water year types.
- Flood releases from Millerton Lake may be diverted from Reach 2B into the Chowchilla Bypass as well as to Mendota Pool where they can be used to fulfill water contracts or by legal water rights holders while alleviating pressure on the flood system. This would occur primarily in normal-wet to wet water year types. Some portion of these flows is anticipated to perform as Restoration Flows in Reach 2B, but the flood management agencies will have ultimate discretion in directing flood flows.
- Flood releases from Pine Flat Reservoir may be bypassed to the San Joaquin River via Fresno Slough and Mendota Pool, typically in wet water year types. Due to capacity restrictions downstream of Reach 2B, the addition of these flows further restricts the amount of flow that can enter Reach 2B, and more San Joaquin River flows will be diverted into the Chowchilla Bypass to compensate. Some portion of the San Joaquin River flows are anticipated to perform as Restoration Flows in Reach 2B, but the flood management agencies will have ultimate discretion in directing flood flows.

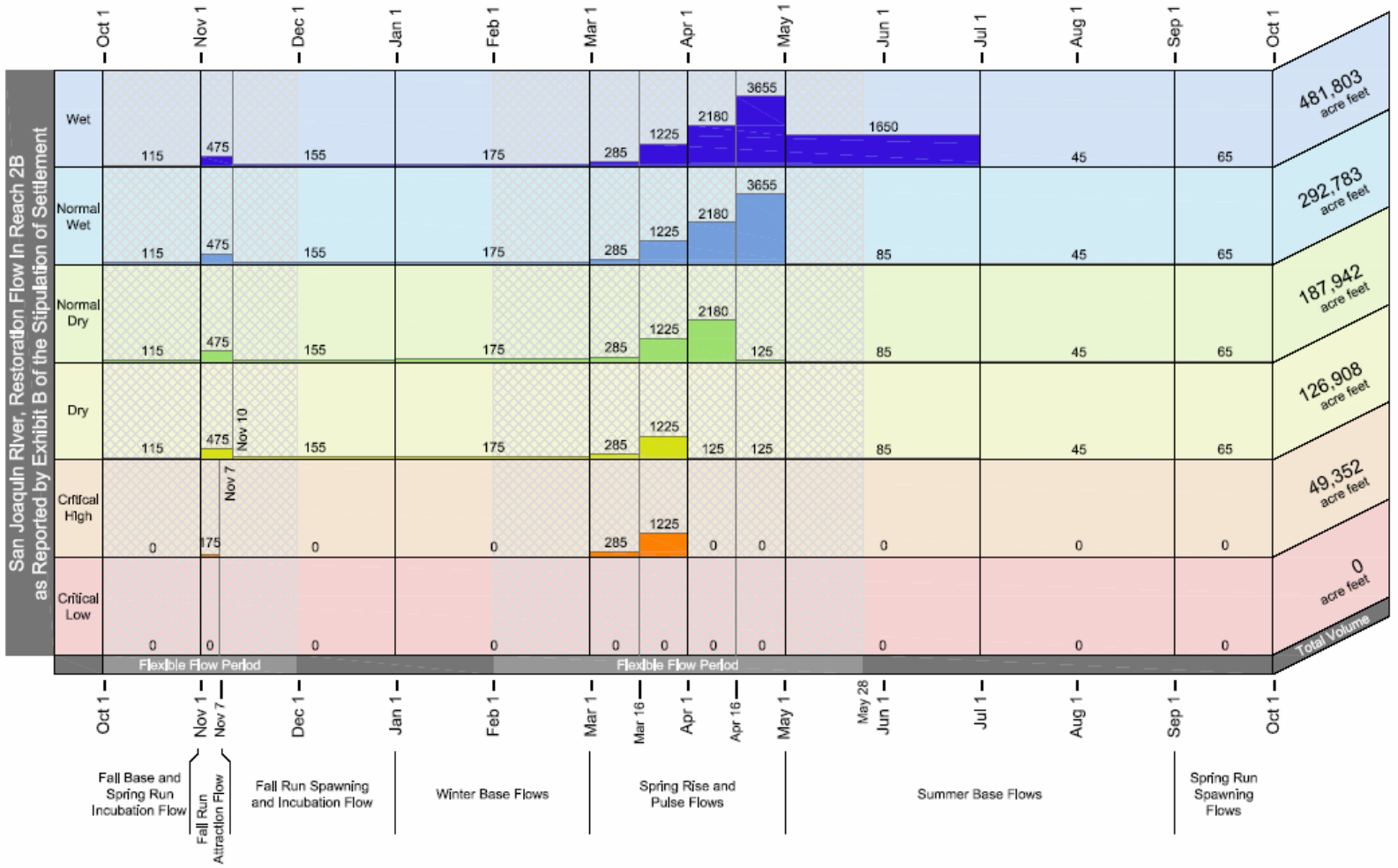
In addition to the above flow scenarios, the Restoration Administrator has the ability to manage Restoration Flows shown in Figure 1-10 to meet the Program's goals and objectives. These management strategies include reshaping the flow block by moving it earlier in the schedule, later in the schedule, compressing the flow block, or extending it consistent with the provisions in the Settlement.

1.7 Organization of this EIS/R

This EIS/R is organized as shown below.

Executive Summary presents the purpose and intended uses of this EIS/R, describes lead agencies, Project location, Project background and future actions, need for action, and Project purpose/objectives, provides an overview of the alternatives under consideration and major conclusions of the environmental analysis, documents the known areas of controversy and issues to be resolved, and summarizes in a table the environmental impacts, mitigation measures, and significance conclusions for the alternatives under consideration. It also presents a comparison of the four Action Alternatives.

Chapter 1.0, "Introduction" summarizes Project background and context, scope of this EIS/R, Project purpose and need for action and objectives, Project area, and EIS/R organization.



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2 1 Hydrographs reflect assumptions about seepage losses and tributary inflows which are specified in the Settlement.
3 2 Reach 2B hydrographs are labeled as Reach 3 in Settlement Exhibit B.

4 **Figure 1-10.**
5 **Restoration Flow hydrographs by restoration year type (Reach 2B)**

Chapter 2.0, "Description of Alternatives" summarizes the process that was implemented to develop, evaluate, and select the alternatives, describes the alternatives including the No-Action/No-Project Alternative, describes options and alternatives that were considered throughout the alternatives formulation process but were eliminated from further consideration and the reasons for their elimination, and describes the State, Federal, and other agency actions (permits and approvals) required in order to implement the Project.

Chapter 3.0, "Considerations for Describing the Affected Environment and Environmental Consequences," describes the Project area, and the approach and terms used to describe the environmental and regulatory setting and environmental consequences for the resource topics presented in Chapters 4.0 through 24.0.

Chapters 4.0 through 24.0 include the environmental and regulatory settings for 21 resource topics, and discussions of methods, significance criteria, environmental impacts, and mitigation measures for potential direct and indirect impacts.

Chapter 25.0, "Cumulative Impacts," provides an analysis of overall cumulative effects of the Project alternatives, including the No-Action/No-Project Alternative, together with other past, present, and reasonably foreseeable future plans and projects to supplement information contained in the PEIS/R (SJRRP 2011a).

Chapter 26.0, "Other NEPA and CEQA Considerations," describes potential significant and unavoidable impacts, the relationship of short-term uses and long-term productivity, irreversible and irretrievable commitments of resources, and growth-inducing impacts of implementing the Project. It also describes the Preferred Alternative, compares the Action Alternatives to each other, and describes the Mitigation Monitoring and Reporting Program (MMRP).

Chapter 27.0, "Consultation, Coordination, and Compliance," summarizes public involvement activities under NEPA and CEQA; consultation and coordination with Federal, State, regional, and local agencies; agencies and organizations consulted; and areas of controversy and unresolved issues. This chapter also describes Federal and State laws and regulations that apply to project-level compliance. In addition, this chapter lists potential permits, regulatory approvals, and needed authorizations.

Chapter 28.0, "References," provides a bibliography of sources cited throughout this EIS/R.

Chapter 29.0, "List of Preparers," lists individuals who participated in preparing this EIS/R and provides qualifications for those individuals.

Chapter 30.0, "Index," lists key terms and topics discussed throughout this EIS/R, and the location of the most relevant discussion or definition of the terms and topics.

Appendices contain background information that supports this EIS/R. The appendices include technical information relevant to the resource topics described in Chapters 4.0 through 24.0.

2.0 Description of Alternatives

As part of implementation of the Stipulation of Settlement (Settlement), U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and California State Lands Commission (CSLC) have prepared this project-level Environmental Impact Statement/Environmental Impact Report (EIS/R) for the Mendota Pool Bypass and Reach 2B Improvements Project (Project). This EIS/R presents a No-Action/No-Project Alternative (hereafter called the No-Action Alternative) and four Action Alternatives to implement the Project. Of the four Action Alternatives, there are two methods of bypassing Restoration Flows around Mendota Pool, two floodplain widths, and four ways to divert water into Mendota Pool. Project alternatives include the following:

- No-Action Alternative.
- Alternative A (Compact Bypass with Narrow Floodplain and South Canal).
- Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative.
- Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal).
- Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal).

2.1 Alternatives Formulation Process

An early step in producing this EIS/R was the formulation of the alternatives that are evaluated in this document. This section presents an overview of the development of the Action Alternatives. Each of the four Action Alternatives developed for the Project consists of a floodplain width which passes 4,500 cubic feet per second (cfs), a method to bypass Restoration Flows around Mendota Pool, and a method to deliver water to Mendota Pool. These objectives are consistent with the Project's purpose and need.

2.1.1 Alternatives Development Process Overview

Alternatives development progressed through several stages. The process began with the Initial Options Technical Memorandum (TM) (San Joaquin River Restoration Program [SJRRP] 2010a) which presented initial options for meeting Project goals and objectives. Input from Program Work Groups, stakeholders, and the public was collected. Subsequently, the initial options were refined based on impact evaluations, additional engineering analyses (appraisal level design), additional data collection, screening criteria, and public input to produce initial alternatives. These initial alternatives were evaluated (SJRRP 2012, Attachment A, "Alternatives Evaluation") using a set of evaluation and screening criteria developed pursuant to National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) requirements, and developed in coordination with Project proponents, to produce the range of reasonable alternatives presented here.

Using information obtained through evaluation and refinement, the final set of bypass, floodplain, and structure options were combined to create the Action Alternatives for the EIS/R. These Project alternatives provide a range of approaches to meet the Project purpose and need, and allows for an assessment of environmental effects.

Opportunities for stakeholder involvement were integrated throughout the alternatives formulation process. Figure 2-1 presents a graphical view of the process.

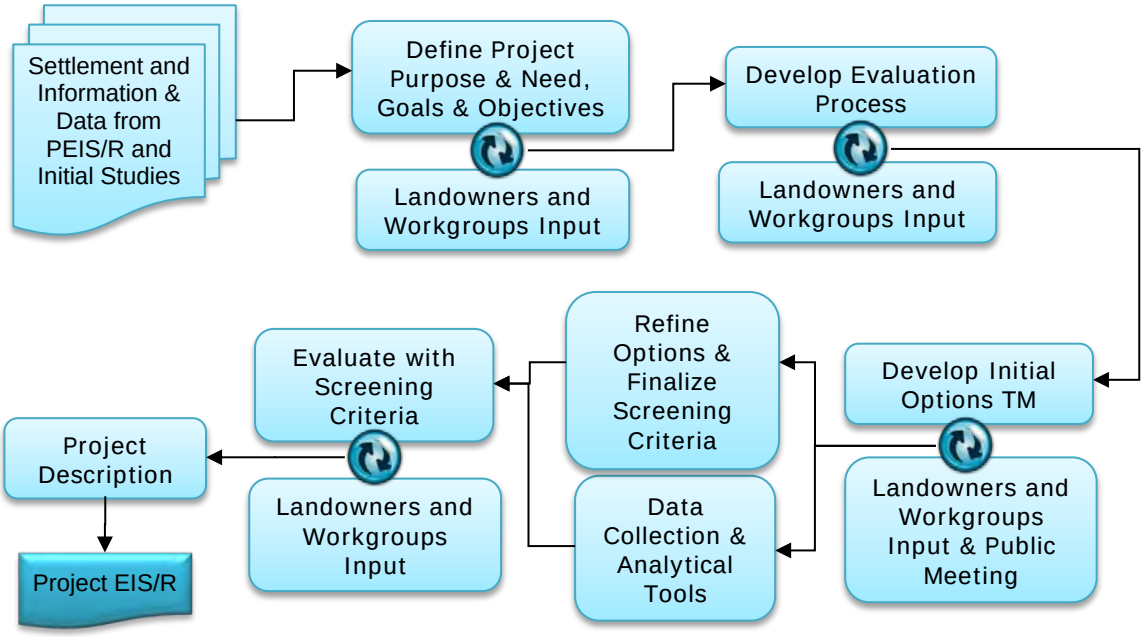


Figure 2-1.
Alternatives Formulation Process

2.1.2 Stakeholder Involvement

The alternatives development process provided opportunities for early stakeholder involvement and input. Primary stakeholders include Federal, State, and local agencies, landowners, the Technical Advisory Committee (TAC), non-governmental organizations (NGOs) and the public. The following sections describe the level of involvement of the various stakeholder groups in the alternatives formulation.

Federal, State, & Local Agencies

Federal and State Implementing Agencies involved in the SJRRP have representatives in the Technical Work Groups and Subgroups. These groups provide support for the development, evaluation, and refinement of concepts. The following groups had input during the alternatives formulation:

Fisheries Management Workgroup:

- California Department of Water Resources (DWR) presented the initial options for the Reach 2B floodplain and Mendota Pool Bypass alignment at the November 10, 2009, meeting.
- Refinement of initial options criteria and requirements related to fisheries was discussed during the December 11, 2009, Fisheries/Alternatives Subgroup.
- The design flow for fish screening was discussed on February 3, 2010.
- Further refinements to the floodplain and Mendota Pool bypass designs were presented and discussed on June 17, 2010, and passage requirements for non-salmonid native fish were also discussed.
- Passage at structures and passage design criteria were presented and discussed on August 19, 2010, and a recommendation was made to present to the Anadromous Fish Screen Program for feedback on fish screen designs.
- A special subgroup was convened twice, on October 27, 2010, and February 24, 2011, with members of the workgroup and other agency staff with expertise in fish passage structure design to discuss technical and engineering issues related to the design of the fish passage structures.
- A workshop was held on June 28, 2011, to discuss alternatives formulation.
- Criteria for fish passage at structures were discussed at a meeting on July 29, 2011.
- A meeting was held on October 25, 2011, to discuss the potential for rock ramp type fish passage facilities.
- A workshop was held on January 10, 2012, to provide an overview of the Ecosystem Diagnosis and Treatment modeling process.
- Members of the workgroup participated in several calls with the Project team to discuss technical issues, approaches to resolving issues, and on-going analyses related to fisheries management.
- The workgroup was involved in the review and comment of some Project-specific documents: the Initial Options TM, Analytical Tools TM, the Project Description TM, and this EIS/R.
- In addition, many calls and emails were exchanged with individuals in the workgroup to discuss specific issues.

Environmental Compliance and Permitting Workgroup:

- The Reach 2B consultant presented the initial options for the Reach 2B floodplain and Mendota Pool Bypass alignment at the December 1, 2009, meeting.
- The approach and use of analytical tools in the alternatives evaluation was presented and discussed at the meeting on May 18, 2010.
- DWR presented the Reach 2B draft borrow areas investigation plan at the meeting on February 15, 2011.

- The workgroup was involved in the review and comment of all Project-specific documents: the Initial Options TM, Environmental Data Needs TM, Analytical Tools TM, Environmental Survey Results TM, and this EIS/R.
- In addition, the Project team has regularly attended the workgroup's meetings to provide Project updates and answer questions.

Engineering and Design Workgroup:

- Engineering and Design Workgroup members developed pre-appraisal level structural options descriptions that addressed channel and floodplain conveyance given the site boundary conditions and a range of potential floodplain and channel characteristics.
- Coordination with the workgroup has resulted in completion of an informal technical review by Reclamation's Technical Service Center in Denver, a Design, Engineering, and Construction review, and completion of a Value Planning Study organized by Reclamation.
- In addition, the Project team has regularly attended the workgroup's weekly conference calls to provide Project updates and answer questions.

Water Management Workgroup:

- The Water Management Workgroup developed flow hydrographs for the purpose of evaluating site-specific alternatives under a range of potential flow schedules. Additionally, the group coordinated with Reclamation and other stakeholders on Program operational guidelines.

Members of all the workgroups were invited to a presentation on the alternatives evaluation to provide input on the mechanism for evaluating the alternatives at a meeting on February 18, 2011.

Fresno and Madera counties:

- Representatives from DWR spoke on the phone (July 27, 2010) and met with the Madera County Road Department (October 5, 2010) to describe the purpose of the Project and its effects on the San Mateo Avenue crossing and Drive 10 ½. DWR solicited input on the use and need for the crossing, as well as desired improvements.
- A representative of DWR spoke on the phone with the Fresno County Road Maintenance Department on July 27, 2010, to describe the purpose of the Project and its effects on the San Mateo Avenue crossing. DWR solicited input on the use and need for the crossing, as well as desired improvements, but Fresno County did not desire to provide input because the crossing is not located within their right-of-way.

Landowners

Meetings are held periodically with the landowners and representatives who have a stake in the Project or are located along the channel in the Project area to provide updates on Project status and collect input on alternatives development.

- Initial landowner consultation began prior to July 2009.
- The Reach 2B floodplain pre-appraisal level themes and Mendota Pool Bypass alignments were presented by DWR at the November 17, 2009, meeting.
- Project status updates, overview of the publically available project-specific documents, concept refinement of the San Mateo Avenue crossing design and use of Little San Joaquin Slough, and the alternatives development process were presented and discussed, and comments were accepted at the May 27, 2010, meeting.
- Project status updates, overview of new publically available project-specific documents, CSLC preliminary findings regarding sovereign and public trust lands, and DWR's land acquisitions process were presented and discussed, and comments were accepted at the March 24, 2011, meeting.
- The CSLC draft administrative sovereign and public trust land maps for Reach 2B, a brief Program update, and a Reach 2B Project update were presented at the October 3, 2011, meeting.
- The Project effects on Mendota Pool and other operations, details of Project components, and effects on infrastructure using large-scale maps were presented at the November 14, 2011, workshop.
- Overview of borrow material needs and the status of geotechnical explorations were presented during the December 16, 2011, conference call.
- Project overview, status, and a brief review of the alternatives were presented to stakeholders associated with Fresno Slough at the May 31, 2012, meeting.
- A meeting was held on January 29, 2013, to introduce the consensus-based alternative concept and approach to the adjacent landowners, canal companies, irrigation districts, levee districts, cities, and the Settling Parties. The consensus-based alternative approach gives these entities the opportunity to provide input on the Project course of action, and their input has been considered during the selection of a preferred alternative.
- Program status updates, Project EIR/S process and schedule, the landowner consensus-based alternative, flood management considerations, and geotechnical investigations techniques, strategy, and schedule were presented and discussed with stakeholders at the August 26, 2013, meeting.
- Program and Project status updates, geotechnical investigation updates, Reach 2B and Mendota Pool operations, levee and structure designs were presented and discussed with stakeholders at the December 20, 2013, workshop.
- Program and Project status updates including review of the landowner consensus-based preferred alternative, and design and field investigations were discussed with stakeholders at the October 15, 2014, meeting.

- In addition, in-person meetings were held with individual landowners and many calls and emails were exchanged with individual landowners to discuss specific issues.

Technical Advisory Committee

The TAC consists of six voting members selected by the Settling Parties to assist the Restoration Administrator regarding areas outlined in the Settlement. Coordination and information sharing between the TAC and the Implementing Agencies is ensured by two non-voting members representing the State agencies (DWR and California Department of Fish and Wildlife [DFW]) and three liaisons from the Federal agencies (Reclamation, National Marine Fisheries Service [NMFS], and U.S. Fish and Wildlife Service [USFWS]). The TAC holds regular meetings as part of its mission on many aspects for the Restoration Administrator, including some meetings that have focused on the Project.

- A meeting was held on September 22, 2010, to review the Project background, fish passage approaches, and fisheries habitat approaches.
- A meeting was held on April 14, 2011, to present the initial alternatives and alternatives evaluation results.
- A meeting was held on January 11, 2012, to present a conceptual habitat assessment approach.
- A meeting was held on January 28, 2013, to discuss the TAC's approach to evaluating the floodplain habitat in the Project alternatives.
- A meeting was held on March 20, 2013, to discuss the results of the TAC's approach to evaluating the floodplain habitat in the Project alternatives.
- A meeting was held on September 17, 2014, to discuss the preferred alternative for the Project.

Non-Governmental Organizations

Several meetings between the Program and NGOs have been held. NGOs typically in attendance at these meetings include: the San Joaquin River Partnership (Audubon California, Defenders of Wildlife, Ducks Unlimited, Natural Resources Defense Council [NRDC], Point Blue Conservation Science, Revive the San Joaquin, River Partners, Sierra Foothill Conservancy, San Joaquin River Parkway and Conservation Trust, the Bay Institute, the Nature Conservancy, the Trust for Public Land, Trout Unlimited, Tuolumne River Trust), Resources Legacy Fund, Proteus, the Environmental Opportunities Group (the Trust for Public Land, American Rivers, San Joaquin River Parkway and Conservation Trust, River Partners, the Nature Conservancy, Audubon California, NRDC, and Trout Unlimited), and others.

- A meeting was held with the San Joaquin River Partnership on March 19, 2013, to provide a status update on the Project and to present and discuss the Project alternatives.
- A meeting was held with Resources Legacy Fund, Proteus, and the Mayor of Mendota on December 10, 2013, to provide a status update on the Project and to present and discuss the Project alternatives.

- Meetings were held with the Environmental Opportunities Group on December 16, 2013, January 17, 2014, and August 14, 2014, to provide a status update on the Project and to present and discuss the Project alternatives.
- Meetings were held with the Resources Legacy Fund and Proteus on May 2, 2014, and September 30, 2014, to provide a status update on the Project and to present and discuss the Project alternatives.
- A meeting was held with Pete Dangermond (formerly with California State Parks, now under contract with the Resources Legacy Fund) and Dave Koehler (Executive Director of San Joaquin River Parkway and Conservation Trust) on August 6, 2014, to provide a status update on the Project and to present and discuss the Project alternatives.
- In addition, representatives of various NGOs attend the Program's Technical Feedback Group meetings as well as other meetings with the Program and agencies (e.g., DWR Upper San Joaquin River Regional Flood Management Plan process meetings).

Public

Reclamation and DWR held two public scoping meetings in July 2009, for the purpose of initiating the NEPA and CEQA public input processes on the Project. During the scoping meetings and throughout the public comment period, Reclamation and DWR accepted comments on the Project regarding the range of alternatives, the environmental effects, and the mitigation measures to be considered in this EIS/R. Suggestions regarding the pre-appraisal level themes were documented in the Scoping Report (SJRRP 2010b) and have been considered in this EIS/R.

The SJRRP organized and held several public outreach meetings in the form of Technical Feedback Groups. The Project proponents participated in the April 28, 2010, Restoration Goal Technical Feedback Group meeting by providing an overview and discussion of the Initial Options TM and Analytical Tools TM and in the May 17, 2012, Restoration Goal Technical Feedback Group meeting by providing a status update on the Project and an overview of technical challenges the team worked on during alternatives formulation.

The SJRRP also organized and held a Spanish-speaking community meeting on December 9, 2014. An overview of the SJRRP was presented, the Project and Project alternatives were discussed, input from the community was requested, and discussion and feedback from the community was facilitated through small group discussion.

2.1.3 Initial Options Formulation

The initial options were formulated based on existing information and data, preliminary engineering analyses and screening, as well as input from Program Work Groups, stakeholders, and the public. Individual and group landowner meetings were held to present and obtain input on the initial options presented. One of the guiding Project objectives and subsequent analyses pertain to flow conveyance. A one-dimensional hydraulic model was completed during the development of initial channel/floodplain options to examine the largest range of practical and feasible floodplain widths given a reasonable range of management and habitat restoration strategies. Initial screening

involved reviewing the options for consistency with the Settlement requirements and for technical feasibility. Any option deemed technically infeasible or beyond the scope of the Settlement or contrary to its requirements were not carried forward for further consideration.

2.1.4 Alternatives Formulation

An early step in developing this EIS/R was the formulation of the Action Alternatives addressed by this document. The process diagram shown in Figure 2-2 depicts the steps in the formulation process.

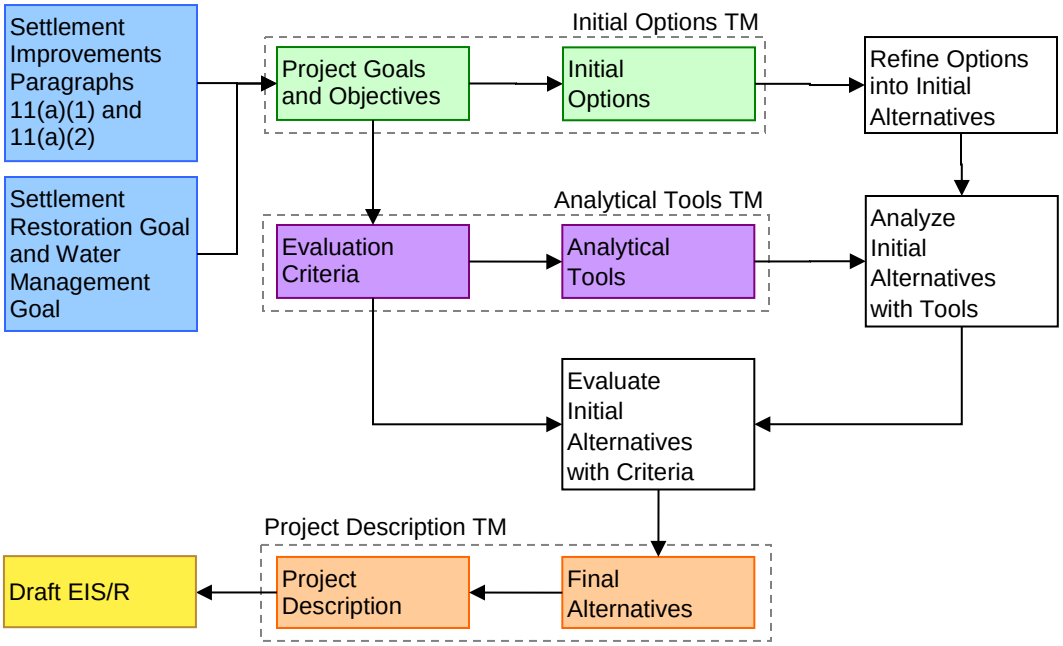


Figure 2-2.
Alternatives Formulation Process Diagram

The initial guidance for developing the Project comes from language in the Settlement, specifically the Settlement's goals and the Settlement defined improvements. These goals and improvements are consistent with the Project's purpose and need (see Section 1.4). The Settlement goals are:

The Restoration Goal (Settlement Paragraph 2):

> *… a goal of this Settlement is to restore and maintain fish populations in "good condition" in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally-reproducing and self-sustaining populations of salmon and other fish (the "Restoration Goal").*

The Water Management Goal (Settlement Paragraph 2):

> *…a goal of this Settlement is to reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in this Settlement (the "Water Management Goal").*

The Mendota Pool Bypass and Reach 2B improvements defined in the Settlement are (Settlement Paragraph 11[a]):

> *(1) Creation of a bypass channel around Mendota Pool to ensure conveyance of at least 4,500 cfs from Reach 2B downstream to Reach 3. This improvement requires construction of a structure capable of directing flow down the bypass and allowing the Secretary to make deliveries of San Joaquin River water into Mendota Pool when necessary;*
>
> *(2) Modifications in channel capacity (incorporating new floodplain and related riparian habitat) to ensure conveyance of at least 4,500 cfs in Reach 2B between the Chowchilla Bifurcation Structure and the new Mendota Pool bypass channel.*

Alternatives formulation builds on the Settlement goals and project-specific improvements and progresses through three stages: initial options, initial alternatives, and final alternatives.

- Initial options represent the preliminary concepts and the basic components for project implementation. They were developed based on existing information and data, studies undertaken for the Program Environmental Impact Statement/ Environmental Impact Report (PEIS/R) process, pre-appraisal level analyses and screening, as well as input from Program Work Groups, stakeholders, and the public. The initial options are described in the Initial Options TM (SJRRP 2010a).
- The initial options were refined into initial alternatives based on additional concept refinement and engineering analyses, preliminary cost-benefit analyses, additional data collection, and input from the Program, Program Work Groups, stakeholders, and the public. The initial alternatives represent a range of feasible implementation strategies incorporating appraisal-level design and analysis.
- The initial alternatives were evaluated based on the evaluation criteria and with the tools described in the Analytical Tools TM (SJRRP 2010c). The Project Description TM Attachment A – Initial Alternatives Evaluation (SJRRP 2012) documents the methods and results of the evaluation and makes recommendations for final alternatives.

2.1.5 Summary of the Alternatives Evaluation Process

A set of evaluation criteria were proposed in the Analytical Tools TM with which to evaluate the initial alternatives on the basis of flow conveyance and operations, fish habitat and passage, habitat restoration, geomorphology and sediment, groundwater, land

use, economics, and socioeconomics, and costs. The criteria were developed based on the Project goals and objectives as a means of determining whether the initial alternatives meet those goals and objectives. During the appraisal-level design, additional detail was developed for each component and structure, new and refined modeling of the river channel and floodplains was conducted, and new data from field surveys became available. The criteria were further refined based on the available data, analyses, and the level of design, and the criteria were grouped into various factors, categories, and finally implementation feasibility, benefits, and impacts perspectives.[1]

Data representing the performance of the initial alternatives according to each applicable criterion were generated and input into an evaluation matrix spreadsheet. The evaluation process leveraged concurrent data collection efforts, engineering analyses and modeling, as well as stakeholder and public input. Using the evaluation matrix, the initial alternatives were scored according to their performance at the factor, category, perspective, and overall levels allowing for an understanding of the initial alternatives with respect to the goals and objectives of the Project.

Below is a summary of the evaluation criteria. The criteria are explained in-depth in the Project Description TM, Attachment A – Initial Alternatives Evaluation, Section 6.0 (SJRRP 2012).

Objectives/Benefits Achievement

Fish Habitat and Passage

- Rearing habitat: total acres of floodplain with a depth greater than 1.0 feet at 2,500 cfs.
- Shallow Water Habitat Quality: a rating based on the proportion of very shallow water habitat (less than 0.5 feet) to the amount of rearing habitat (greater than 1.0 feet).
- Artificial structures in the migratory path: number of structures that adult salmon would need to pass. Each grade control structure, dam sill, fish passage facility (or bifurcation structure), and crossing is considered as an individual structure.
- Total number of steps at structures: the number of steps an adult salmon would need to jump or swim through. Each grade control structure, dam sill, and fish passage facility step is considered as an individual step.
- Fish screens along the migratory path: the number of fish screens with large diversion rates (greater than 100 cfs) that juvenile salmon may encounter along the migratory path.
- Potential predation sites at structures: the number of potential predation sites that juvenile salmon may encounter along the migration path. Each grade control structure, dam sill, fish passage facility (or bifurcation structure), fish screen outlet, and crossing is considered a potential predation site.

[1] Factors, categories, and perspectives are tiered groupings of the evaluation criteria. Factors are groupings of criteria, categories are groupings of factors, and perspectives are groupings of categories.

Habitat Restoration

- Wetlands and other waters of the U.S. area: the acreage of restored habitat with hydrophytic vegetation and on hydric soils.
- Sensitive vegetation alliance extent: the acreage of potential future sensitive vegetation alliances based on the Preliminary Planting Plans.
- Wildlife habitat extent: the acreage of potential future wildlife habitat types resulting from the restoration.
- Special status species habitat extent: the acreage of potential future habitat for special status wildlife species based on the wildlife habitat types.

Geomorphology

- Potential for lateral migration to impact levees: The estimated cost of providing erosion protection (revetment) on levees that may be impacted by lateral erosion.

Impacts

Groundwater

- Acres of land in which groundwater levels rise above 5-foot monitoring threshold: The acreage of land outside the proposed levee alignments that is anticipated to have shallow groundwater elevations above the 5-foot monitoring threshold and is thus subject to mitigation measures to prevent waterlogging.
- Acres of land in which groundwater levels rise above 7-foot monitoring threshold: The acreage of land outside the proposed levee alignments that is anticipated to have shallow groundwater elevations above the 7-foot monitoring threshold and is thus subject to mitigation measures to prevent waterlogging.

Land Use

- Acres of farmland removed from production: The total acres of alfalfa, almond, grapes, other row crops (grouped), palm, and pistachio that would be permanently removed from production due to the construction and long-term operation of the initial alternatives.

Socioeconomics and Economics

- Reduction in annual agricultural production values: The total production value based on unit production values and the acreage permanently removed from production due to the construction and long-term operation of the initial alternatives.

Environmental

- Wetland impacts: The estimated acreage of direct impacts to wetlands resulting from the initial alternatives.

- Sensitive vegetation alliance direct impacts: The estimated acreage of direct impacts to sensitive vegetation alliances resulting from the initial alternatives.
- Special status wildlife habitat impacts: The estimated acreage of direct impacts to special status wildlife habitat resulting from the initial alternatives.
- Historic properties potentially effected: The number of recorded historic properties identified within the extents of the initial alternatives.
- Buried deposits sensitivity: The highest buried deposits sensitivity within the extents of the initial alternatives based on the landform age scale.

2.2 Description of Alternatives

This section describes the alternatives developed for the Project. Each of the Action Alternatives consists of a floodplain width which passes 4,500 cfs, a method to bypass Restoration Flows around Mendota Pool, and a method to deliver water to Mendota Pool. Action Alternatives are considered to comply with the terms of the Settlement, substantially meet the Project goals and objectives, and have benefits potentially offsetting their impacts. Alternatives have been assessed for environmental impacts to the various resource areas (see Chapters 4.0 to 24.0).

2.2.1 NEPA and CEQA Requirements

NEPA Requirements

Reclamation, as the Project proponent and Federal lead agency, is responsible for the development of alternatives that meet NEPA requirements. For the Project alternatives, including the proposed action, NEPA requires that Federal government agencies shall (40 CFR Section 1502.14):

> *(a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.*
>
> *(b) Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits.*
>
> *(c) Include reasonable alternatives not within the jurisdiction of the lead agency.*
>
> *(d) Include the alternative of no action.*
>
> *(e) Identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference.*
>
> *(f) Include appropriate mitigation measures not already included in the proposed action or alternatives.*

CEQA Requirements

CSLC, as the State lead agency, is responsible for the development of alternatives that meet CEQA requirements. Section 15126.6 of the State CEQA Guidelines requires that:

- An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation. An EIR is not required to consider alternatives which are infeasible.
- The range of potential alternatives to the proposed project shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects.
- The specific alternative of "no project" shall also be evaluated along with its impact.
- The EIR should briefly discuss the rationale for selecting the alternatives to be discussed. The EIR should also identify any alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination…. Among the factors that may be used to eliminate alternatives from detailed consideration in an EIR are:
  - (i) Failure to meet most of the basic project objectives.
  - (ii) Infeasibility.
  - (iii) Inability to avoid significant environmental impacts.

This joint EIS/R is prepared in accordance with both NEPA and CEQA, with the Action Alternatives analyzed at an equal level of analysis (consistent with NEPA standards).

2.2.2 Overview of Alternatives

This EIS/R presents the No-Action Alternative and four Action Alternatives to implement the Project. Each Action Alternative includes the actions called for in the Settlement for the Mendota Pool Bypass and Reach 2B. Project alternatives include the following:

- No-Action Alternative.
- Alternative A (Compact Bypass with Narrow Floodplain and South Canal).
- Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative.
- Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal).
- Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal).

2.2.3 No-Action Alternative

The No-Action Alternative is required for the analysis of environmental effects according to NEPA and CEQA. Under this alternative, the Project would not be implemented. The No-Action Alternative is not consistent with the Settlement.

Existing conditions were developed for each resource area based on the availability of historical data and recent observations. Future conditions were based on reasonably foreseeable actions that would occur without the Project. The planning period for the future condition evaluation would vary depending on the resource area. The conditions under the No-Action Alternative are the conditions that are predicted to exist in the Project area during the planning period if the Project is not implemented.

No-Action Conditions

If the Project were not implemented, the components described in the Action Alternatives would not be implemented; however, the No Action Alternative assumes that other components of the SJRRP, as described in the 2012 Record of Decision, and other reasonably foreseeable actions consistent with current management direction expected to occur in the Project area, would be implemented.

The No-Action Alternative generally assumes no channel or structural improvements would be made in Reach 2B, and Restoration Flows would be reduced to not exceed the existing Reach 2B capacity. It is assumed for the No-Action condition that agriculture would continue and cropland would be the dominant cover type, consistent with the existing condition. The following assumptions about No-Action have been evaluated in the resource sections of the Project EIS/R.

Fisheries

In the No-Action Alternative, the maximum channel conveyance would be limited to the existing capacity. Fish passage improvements would not be provided at structures (Chowchilla Bifurcation Structure, San Mateo Avenue, and Mendota Dam). However, the remainder of the SJRRP would proceed, and salmon would be reintroduced into the San Joaquin River. Each spring during their outmigration, downstream migrating juveniles would be entrained in diversions from Mendota Pool and succumb to high rates of predation by non-native fish present in Mendota Pool. Adult salmon would be blocked on their upstream migration at Mendota Dam in all years except wet year types. Blocked adult salmon would be exposed to poaching in the river below Mendota Dam and poor water quality later in the year. There is no spawning substrate in Reach 3, downstream of the dam, so blocked adult fish would require alternative efforts (e.g., trap and haul) to reach spawning grounds or would not spawn successfully.

Habitat

Under the No-Action Alternative, habitat conditions in the Project area may change to the extent that Restoration Flows may recruit new vegetation in some areas. In this alternative, if Restoration Flows were to enter Reach 2B, the condition of the narrow strips of native riparian vegetation along the channel banks downstream of the San Mateo Avenue crossing would be maintained by the relatively stable water level held by

Mendota Dam. Upstream of San Mateo Avenue, riparian vegetation may recruit along the wetted channel banks unless vegetation removal is employed.

Seepage

The No-Action Alternative would maintain the existing levee alignments and heights and maximum conveyance would continue to be limited to the existing capacity. If Restoration Flows enter the existing Reach 2B, there would probably be a minimal increase in seepage from the river channel but since capacity would remain unchanged, this may be similar to the seepage experienced during Interim Flows under existing conditions. However, the SJRRP Seepage Management Plan would be implemented, and actions could be taken as part of that plan to reduce seepage effects from Restoration Flows.

Land Use, Agriculture, Economics & Socioeconomics

Under No-Action conditions, future land use in the area is unlikely to change. Reach 2B is in the unincorporated areas of both Fresno and Madera Counties. The nearest incorporated cities are Firebaugh and Mendota, both in Fresno County Population is expected to increase annually, compounded, by 1.1 percent and 1.3 percent in Fresno and Madera Counties, respectively, between 2010 and 2060 (California Department of Finance 2014). Most of that growth would likely occur in areas near the main cities in each of the counties. While population and economic projection data for specific unincorporated subareas of the counties are unavailable, neither agricultural nor non-agricultural activity is likely to expand substantially in the Mendota area.

If the Reach 2B Project is not implemented, future socioeconomic conditions in the pertinent Fresno and Madera County areas relative to conditions in other areas in the two counties would be expected to be similar. It is expected that the Reach 2B area would remain in agriculture and that most of the working population in the area would remain employed in agriculture and related industries.

Geomorphology

The No-Action Alternative would maintain the existing levee alignments and heights and maximum conveyance would continue to be limited to the existing capacity. If Restoration Flows enter the existing Reach 2B, sand transport would likely increase; however, recent sediment continuity studies have predicted that sand inputs from Reach 2A under Restoration Flows will likely result in net deposition in the upper segment of Reach 2B and potentially down to the Mendota Pool. The No-Action Alternative would not likely change the existing geomorphic conditions in Reach 2B.

2.2.4 Elements Common to All Action Alternatives

Action Alternatives would be designed to provide:

- Conveyance of at least 4,500 cfs in Reach 2B and through the Mendota Pool Bypass.
- Diversion of up to 2,500 cfs from Reach 2B into Mendota Pool.

Additionally, some constructed elements are also common to all Action Alternatives. Those elements are described below.

Fish Habitat and Passage

The amounts of fish habitat and the number of structures fish would need to pass vary among the Action Alternatives; however, some conditions and criteria are consistent across alternatives and warrant discussion here.

One of the primary focuses of the Action Alternatives is to provide floodplain and riparian habitat to provide benefit to migrating juvenile and adult salmonids and other native fishes. Floodplain and riparian habitats in the Action Alternatives would include a variety of native plant communities suited to the hydrology, soils, and climate of Reach 2B and the San Joaquin Valley.

The Action Alternatives also include provision of fish passage at structures for salmonids and other native fish. These structures vary by alternative but overall include fish screens, fish passage facilities, grade control structures, and bifurcation structures (under certain flows). The designs for structures with fish passage components would be based on criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2008) and *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2001). Specifically, the Action Alternatives would provide suitable hydraulic conditions for passage of up-migrating adult salmonids, out-migrating juvenile salmonids, and inter-reach migration of other native fish between Reach 2A and Reach 3. Suitable hydraulic conditions include those conditions which the species is physically capable of passing and do not cause undue stress on the animal. The passage features would be designed to cause no physical harm to fish. The design criteria are structured around the life stages of the target anadromous species and the timing of the runs for upstream movement of adult fall and spring run Chinook and winter steelhead and the downstream movement of juvenile life stages spawned from these runs. Recommended criteria are based on a combination of swimming ability of the fish species as reported in scientific papers and criteria in agency design guidelines. Recommended design criteria to provide for successful fish passage (depth of flow, suitable velocity ranges and jump height) are provided in Table 2-1. The design criteria for a particular species would be met over the associated flow range (minimum flow to maximum flow).

Table 2-1.
Fish Passage Design Criteria

Species	Life-stage	Migration Timeframe	Frequency	Minimum Flow	Maximum Flow	Maximum Velocity [1]	Minimum Water Depth [2]	Maximum Jump Height [3]	Minimum Pool Depth
			years	cfs	cfs	fps	feet	feet	feet
Chinook salmon	Adult	Spring and fall pulse	All years except CL	115 [4]	4,500	4.0	1.2	1.0	[5]
	Juvenile (downstream)	Nov-May	All years except CL	85 [7]	n/a	n/a	1.0	n/a	[5]
Steelhead	Adult	Spring and fall pulse	All years except CL	115 [4]	4,500	4.0	1.2	1.0	[5]
	Juvenile (downstream)	Nov-May	All years except CL	85 [7]	n/a	n/a	1.0	n/a	[5]
Sturgeon	Adult	Spring pulse	W and NW years	1,138 [8]	4,500	6.6	3.3	None – swim through	n/a
Lamprey	Adult	Spring pulse	All years except CL	125 [6]	4,500	[9]	[9]	[9]	n/a
Other native fish	Adult	Spring pulse	W, NW, and ND years	543 [10]	4,500	2.5	1.0	None – swim through	n/a

W = wet; NW = normal wet; ND = normal dry; CL = critical low

[1] Recommended maximum velocities shown are for grade control structures or structures with short longitudinal lengths based on *Anadromous Salmonid Passage Facility Design* (NMFS 2008) and *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2001). For structures with longer lengths (e.g., culverts and bifurcation structures under certain conditions), maximum velocities would be developed based on criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2008) and *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2001).

[2] Minimum water depth criteria based on 1.5 times body depth or 1 foot depth, whichever is greater based on *Anadromous Salmonid Passage Facility Design* (NMFS 2008) and *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2001).

[3] Maximum jump height criteria based on criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2008) and *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2001).

[4] Based on Exhibit B lowest flow in the fall spawning period (starts Oct 1) for the desired frequency; all Spring Pulse Flows are higher.

[5] Pool depths to be based on criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2008) and *Guidelines for Salmonid Passage at Stream Crossings* (NMFS 2001).

[6] Based on lowest flow within Exhibit B Spring Pulse Flow period for the desired frequency.

[7] Based on lowest flow within desired migration period for the desired frequency.

[8] Wet and normal wet years constitute 50% of years in the historical record. Based on an analysis of varying Restoration Flows management strategies (SJRRP 2010d); flows with a 50% exceedance could range from 1,138 to 4,500 cfs.

[9] Lamprey designs to be based on criteria in *Best Management Practices for Pacific Lamprey* (USFWS 2010)

[10] Wet, normal wet, and normal dry years constitute 80% of years in the historical record. Based on an analysis of varying Restoration Flows management strategies (SJRRP 2010d); flows with an 80% exceedance could range from 543 to 4,500 cfs.

The Action Alternatives include facilities that fish would encounter or need to pass to migrate between Reach 3 and Reach 2A (from downstream to upstream). The need for fish screens at diversion facilities will be further evaluated as Project planning and design continues. The following fish screens are included in the Action Alternatives in the event that they are determined necessary: the Lone Willow Slough fish screen (see Section 2.2.4), Big and Little Bertha pumps screens, and screens on other smaller diversions. Each alternative includes other facilities specific to that alternative. Each structure represents a potential stressor for adult salmon and potential predation site for juvenile salmon. However, each structure would be designed to perform according to fish passage and screening design criteria. In addition, the channel and floodplain elements of the Action Alternatives incorporate riparian areas to provide cover, woody material, and velocity variability, while the design footprint allows sufficient space to accommodate channel structure variability, all of which may help to reduce stress and predation.

During construction, impacts to fish would be minimized by including some or all of the following measures:

- Temporary bypass facilities around construction areas that meet fish passage criteria.
- Construction in the dry (i.e., not in active flows).
- Phased construction that would allow passage to continue in the channel or in the completed portions of structures while other portions are built.
- Fish rescue and relocation.

Levees

The location, length, and height of the levees vary among the Action Alternatives; however, some design criteria and features would be consistent across alternatives and warrant discussion here.

Levees would be required along the Project area to contain Restoration Flows. While the height and footprint of the levees vary according to their location along the channel and the ground elevation, the capacity, freeboard, and cross-section would be consistent. Localized backwater and redirection effects at Project structures would be considered during design of levee heights. Levees would be designed to maintain at least 3 feet of freeboard on the levees at 4,500 cfs. Levee design would be based on the U.S. Army Corps of Engineers (Corps) *Engineer Manual 1110-2-1913-Design and Construction of Levees* guidelines (Corps 2000a) and *Engineer Manual 1110-2-301 Guidelines for Landscape Planting and Vegetation Management at Floodwalls, Levees, & Embankment Dams* (Corps 2000b). The design includes seepage control measures, inspection trenches, maintenances roads, and drainage trenches to direct off-site drainage.

Levee alignments maintain a 300-foot buffer zone, where appropriate, between the levee and river channel to avoid impact to levees over time due to potential channel migration. In areas where a minimum 300-foot buffer zone between the main river channel and levee cannot be maintained, bank revetment would be incorporated in the design.

New levees would be designed to have sideslopes of 3 horizontal to 1 vertical (3H to 1V) on the waterside and landside. A maintenance road and surface drainage ditch would also be included. Surface drainage ditches would only be intended to capture and direct runoff; they are not intended to address groundwater seepage or through-levee seepage. By following the Corps standards, all levees would have an inspection trench. Additional data collection and analysis would be required to verify the groundwater conductivity rates of the *in situ* and borrow soils and to finalize the design of seepage control measures.

The levee alignments shown on the plan views of the Action Alternatives may be adjusted during final design. Adjustments may be made for several reasons, including to improve flow conditions on the floodplain, to improve habitat conditions on the floodplain, to reduce potential erosion, to accommodate adverse soil conditions, and to avoid existing infrastructure among others. The final levee alignments will be within the impact areas evaluated in this document.

Seepage Control Measures

Seepage of river water through or under levees is a concern for levee integrity and adjacent land uses. Through-seepage, water that seeps laterally through the levee section, would be addressed through proper levee design and construction (e.g., selection of low porosity materials and proper compaction). Under-seepage, water that seeps laterally by travelling under the levee section, is primarily controlled by the native soils beneath the levee and seepage control measures would be included where native soils do not provide sufficient control. Seepage control measures would be included, as necessary, in the Project in areas where under-seepage is likely to affect adjacent land uses. Seepage control measures could include: cut-off walls, interceptor drains or ditches, seepage wells, seepage berms, land acquisition (fee title or seepage easements) and other measures that can be implemented within the Project area.[2]

Borrow

Borrow material would primarily be required for the construction of the levees, but it may also be used in the construction of other structures for foundation or backfill material. Levees may be constructed entirely of local borrow material, a mix of local and imported borrow material, or just imported borrow material. Borrow locations will be determined after a geotechnical exploration of the local borrow areas is complete; the exploration will determine the suitability of local soils for use as borrow material. Until the exploration can be complete, it is assumed that all levee fill will come from local borrow sites. Investigation and analysis of potential borrow sites is ongoing by SJRRP, and the borrow area information will be updated as new information becomes available.

[2] A cut-off wall is a construction technique to reinforce areas of soft earth that are near open water or a high groundwater table with a mixture of soil, bentonite, and cement. Interceptor drains are buried perforated pipes and interceptor ditches are surface ditches, both of which intercept groundwater and redirect it to a discharge point. Because the drains and ditches have lower resistance to flow, the groundwater table can be kept artificially low in areas near the pipe or ditch. The discharge point could include a lift pump to move drained water over the levees, or it could be discharged directly to a surface water body (e.g., agricultural canal). Seepage wells are groundwater wells that are used to pump and draw down the water table where seepage is occurring. Seepage berms are berms placed on the landside of a levee to add additional weight and width to the levee to counteract seepage.

Topsoil from local borrow areas would be stockpiled for reuse at the borrow site or within the Project area.

The locations of borrow areas are dependent on the locations of suitable materials. To the extent that suitable materials and the locations for floodplain grading coincide, borrow from those areas may be preferred. Borrow from within the Project levees will be designed to be compatible with native fish habitat and uses by either reconnecting to the river channel or by restoring to an appropriate elevation to prevent stranding.

It is estimated that up to 350 acres of land total will be needed for borrow areas. This includes borrow locations inside and outside the Project levees (identified as Potential Borrow Area on Figure 1-2). Borrow areas will avoid sensitive biological resources to the extent practicable.

Levee and Structure Protection

Action Alternatives generally provide a minimum 300-foot buffer between the existing channel and the proposed levee, where appropriate and feasible. For locations where the 300-foot buffer was not included, erosion protection for the levee in the form of revetment would be included. The revetment would be riprap material covered by soil and then planted to provide a vegetated surface. However, softer approaches, such as bioengineering or dense planting, may be considered during design depending on velocities and scour potential. Locations that require revetment include areas where the 300-foot buffer was not included due to the proximity of existing infrastructure, near the proposed structures, and along river bends less than 300 feet from the levee in areas that have the potential to erode, as determined in the design process.

Channel Bank Protection

Action Alternatives could include riparian vegetation, rock vanes, woody materials, revetment, or other measures designed to protect channel banks from erosion. Bank protection measures would be installed in locations susceptible to and likely to experience bank erosion.

Removal of Existing Levees

Removal of portions of the existing levees is included and designed to expand the inundation area of the floodplain out to the proposed levees and improve connectivity between the river channel and proposed floodplain. The locations of existing levee removal would be based upon the hydraulic performance of the channel and floodplain. In certain locations, however, highly desirable existing vegetation (native and sensitive vegetation communities that can serve as seed banks for future vegetation communities) can be found on the existing levees. Where hydraulic performance and connectivity of the floodplain would not be negatively affected, portions of the existing levees with highly desirable vegetation would remain in place. Materials that are removed from the existing levees would likely be reused within the Project area.

Floodplain and Channel Grading

Floodplain and channel grading would be included with the Action Alternatives. Floodplain and channel grading would include any or all of the following at locations to be determined during design:

- Creating high-flow channels through the floodplain to increase the inundation extent at lower flows.
- Connecting low-lying areas on the floodplain to the river to prevent stranding.
- Removing high areas where flow connectivity would be impeded (e.g., farm road grades).
- Excavating floodplain benches adjacent to the river channel to increase the frequency of inundation.
- Creating greater inundation depth diversity on the floodplain.
- Excavating channels in portions of the Project area to tie into existing elevations upstream and downstream of the Project or to create desirable sediment transport conditions.

Floodplain and channel grading can provide benefits to salmon and other native fish by allowing inundation to occur at lower flows, by distributing suitable rearing habitats further into the floodplain, by connecting rearing habitat to primary production areas (shallow water habitat), by providing escape routes during receding flows, and by confining flows to a deeper, narrower channel to limit temperature increases.

Figure 2-3 provides an example of how various floodplain grading approaches can be used to expand inundation on the floodplain. The Existing Channel graphic shows an example of how inundation would occur without floodplain grading. The Lowered Floodplain example shows an example of how floodplain benches, lowered areas to either side of the channel, could be used to inundate floodplain areas at lesser flows. This graphic also shows how lowered floodplains could affect inundation at moderate flows. The High Flow Channels graphic shows an example of how high flow channels, side channels that initiate at larger flows than the main channel, could be used to expand floodplain inundation.

Lone Willow Slough Fish and Riparian Diversions Screens

Lone Willow Slough connects to the river at approximately River Mile (RM) 215.9 just downstream of the Chowchilla Bifurcation Structure. Some Action Alternatives include construction of a fish screen at this diversion, if determined necessary. During flood control releases from Friant Dam and when the Exchange Contractors are exercising their water rights on the San Joaquin River, in lieu of taking substitute water from the Delta-Mendota Canal, up to 125 cfs of water may be diverted for irrigation from Reach 2B into the Lone Willow Slough. A screen would prevent fish from entering the canal when flows are being diverted. The fish screen structure would consist of a 15-foot by 21-foot concrete hollow box, with the river side of the box open to river flows and the back of the box fitted with a board guide to control diversion into the irrigation canal. The opening at the riverside would include an automated cleaner system, trash rack and a fish screen to

prevent migrating fish from entering the intake. The screen would be designed to meet *Anadromous Salmonid Passage Facility Design* (NMFS 2008) criteria.

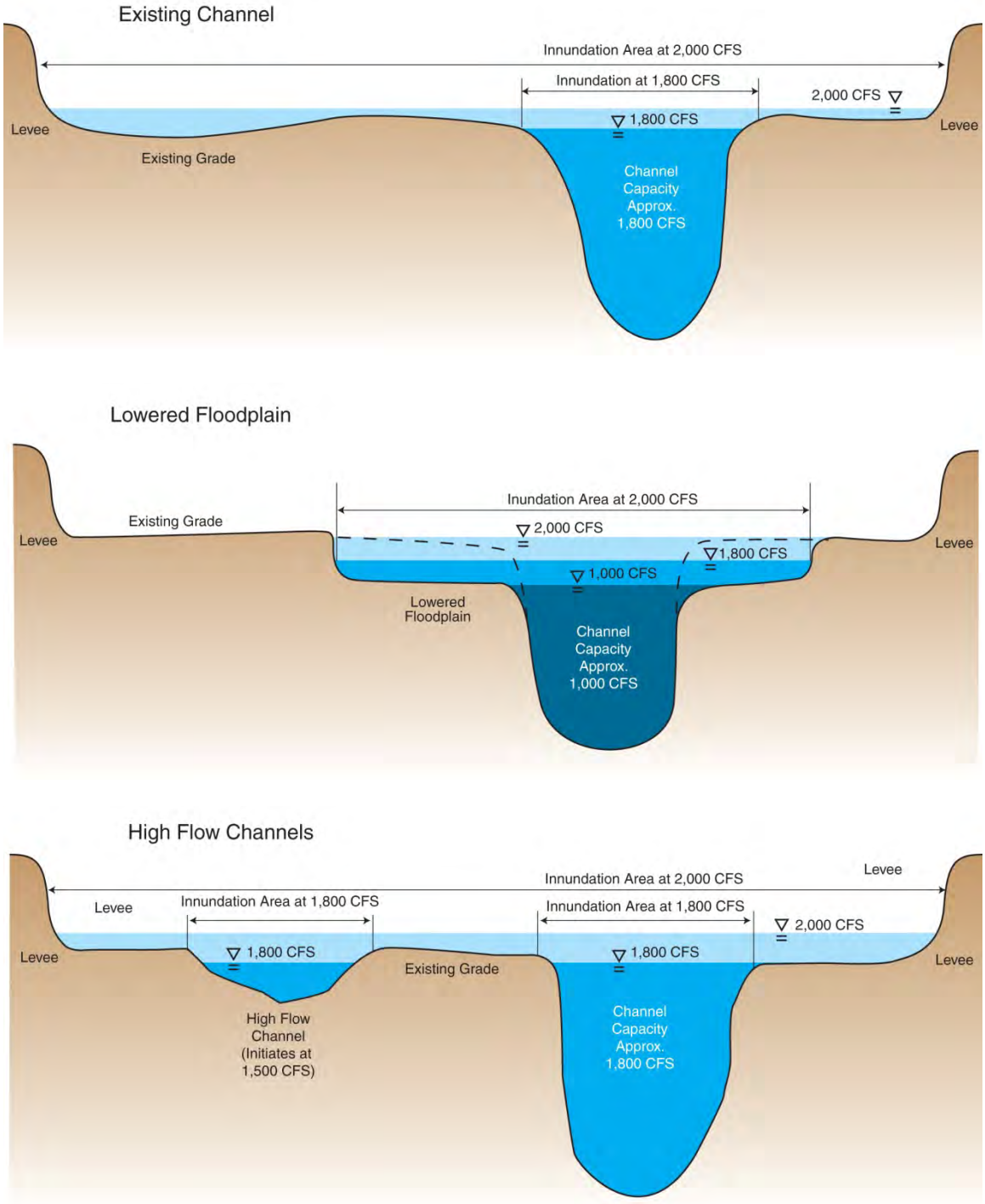


Figure 2-3.
Example Floodplain Grading Approaches

There are existing diversion pumps located along Reach 2B (e.g., Big and Little Bertha pumps). These pumps would be retrofitted with fish screens, where required, to prevent migrating fish from entering the intakes. The screens would be designed to meet *Anadromous Salmonid Passage Facility Design* (NMFS 2008) criteria.

Infrastructure for Fish Monitoring

The designs for control structures, fish passage facilities, and fish screens include security fences and gates, mounting hardware, and electrical supply in order to conduct fish monitoring activities. Construction, operations, and maintenance of the fish monitoring infrastructure are included as part of this Project. The fish monitoring activities themselves are not included in this Project, and will be addressed in subsequent environmental analysis, as appropriate.

Existing Infrastructure Relocations or Floodproofing

Existing infrastructure (see Figure 2-4) such as groundwater wells, pumps, electrical and gas distribution lines, water pipelines, and canals is located in the Project area and would require relocation, retrofitting, or floodproofing to protect the structures from future Restoration Flows and increased floodplain area. Although the relocations, retrofits, and floodproofing would be included as part of the Project; the actual relocation, retrofit, or floodproofing work may be performed by others. As a result of the Project, some existing infrastructure may be unnecessary in the future (e.g., power lines that service pumps relocated to outside the Project area). In these cases, infrastructure may be demolished or abandoned in place.

Electrical and Gas Distribution

The length of electrical and gas distribution line identified for possible relocation was evaluated for the Action Alternatives. Information from Pacific Gas & Electric (PG&E) was available for portions of the area in GIS shapefile format and was supplemented by field data. At the current level of design, it was assumed that the length of existing electrical and gas distribution line found within the Project area would need to be replaced.

Canals and Drains

The length of canals identified for possible relocation was evaluated for the Action Alternatives. On-farm canals and drains visible on the LiDAR imagery (Central Valley Floodplain Evaluation and Delineation [CVFED] 2009) and identified during on-site field meetings with landowners were quantified. No canal and drains outside the Project footprint have yet been identified for redesign. Some portions of canals and drains could be discontinued in the future; the extent of discontinued and replaced canals will be considered during landowner negotiations. No subsurface drains were able to be quantified; however, some are believed to exist within the area.

Lift Pumps

The number of lift pumps identified for possible relocation was evaluated for the Action Alternatives. Lift pumps visible on the LiDAR imagery (CVFED 2009) or noted in the CalFish Passage Assessment Database (CalFish 2014) were assumed to require relocation to new facilities on the edge of the proposed levees. A pilot channel dug from the low

flow river channel to the intake of the relocated pumps was also assumed. Locations in the CalFish Passage Assessment database were confirmed using the LiDAR imagery when possible.

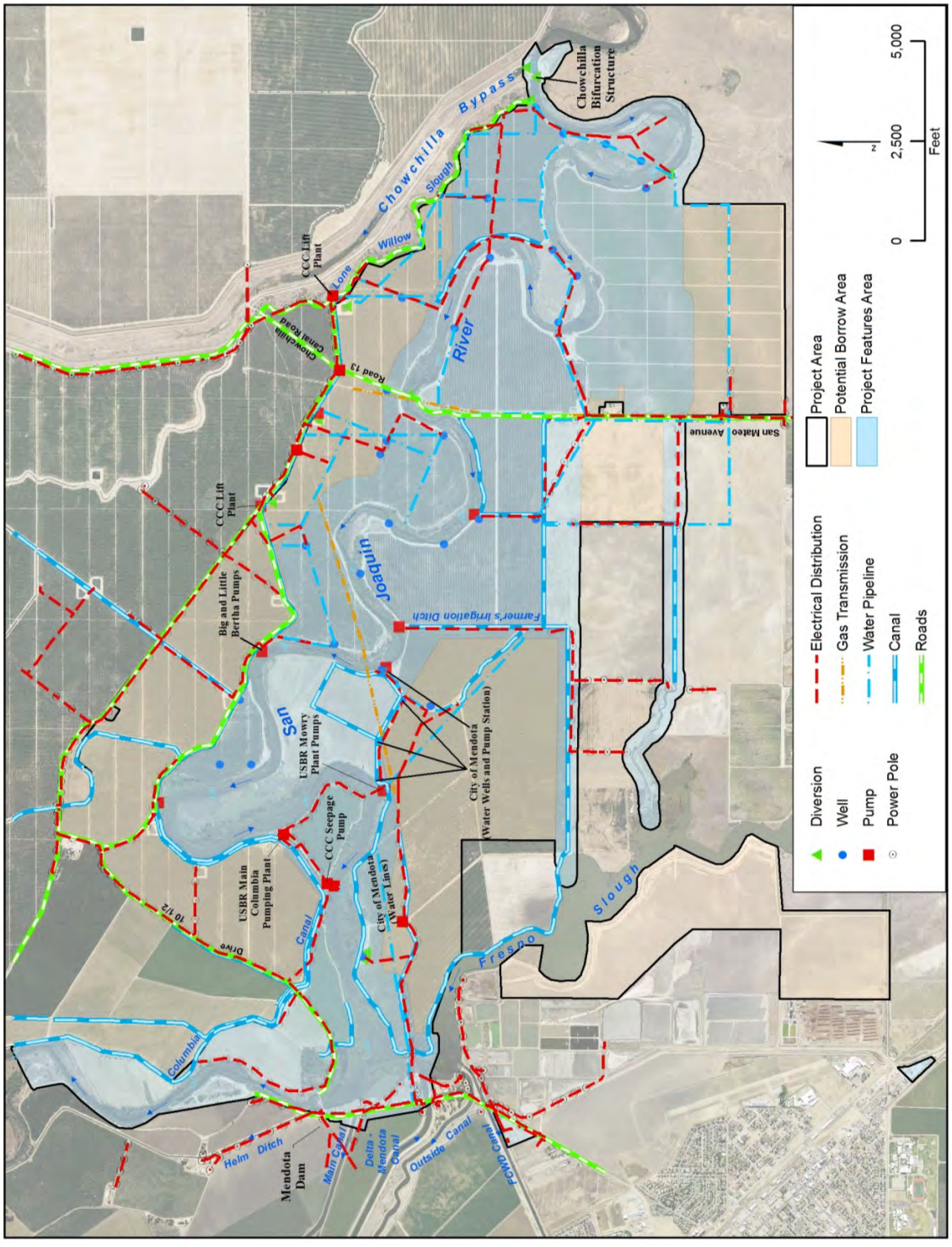


Figure 2-4.
Existing Infrastructure in the Project Area

Groundwater Wells

The number of existing wells identified for possible floodproofing or relocation, including the city of Mendota groundwater wells, was evaluated for the Action Alternatives. Wells were identified within the area using aerial photography. During design, the DWR wells database would be consulted for an estimate of abandoned wells that have not been destroyed, so that these old wells would not be conduits for flood waters to the groundwater. A formal well canvas would also be conducted. Floodproofed wells would be provided with year-round vehicular access via a raised roadbed across the floodplain. The roadbed could include multiple culverts to support floodplain connectivity, depending on the length of the access road and its effect on floodplain flows. Wells relocated by the Project would provide equal utility. Wells taken out of service by the Project would be abandoned in accordance with U.S. Environmental Protection Agency (EPA), DWR and/or local regulations.

Regulating Reservoirs

The number of irrigation regulating reservoirs identified for possible relocation was evaluated for the Action Alternatives. Reservoirs were assumed to be a typical size, contain one lift pump, and half of the reservoir located below the surrounding grade and half above the surrounding grade.

Oil and Gas Wells

Two closed or active oil and gas wells have been identified within the Project area for potential closure, relocation, or buyout. If active oil and gas wells cannot be avoided, the destruction or closure of those wells would be conducted in accordance with the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) regulations.

Other Utilities

Other infrastructure was identified within the impacted areas. Other facilities include: high voltage transmission lines, gas lines, and water pipelines. High voltage transmission lines are assumed to be high enough to not be impacted. Gas lines are typically attached to bridges or buried below the river when crossing the river and were assumed not to require relocation. Water pipelines were quantified from existing maps and discussions with landowners. Water pipelines may be relocated or abandoned depending on their future use requirements. Service line crossings (e.g., gas, water, electrical) would be considered during levee design.

Construction Access

Access for vehicles carrying materials, equipment, and personnel to and from the construction area would be provided via several existing roadways in the Project vicinity (see Figure 2-5). Improvements may be required to upgrade roadways, pavements, and crossings for anticipated construction traffic and loads, provide adequate turning radii and site distances, and to control dust on non-paved roads. Anticipated improvements include:

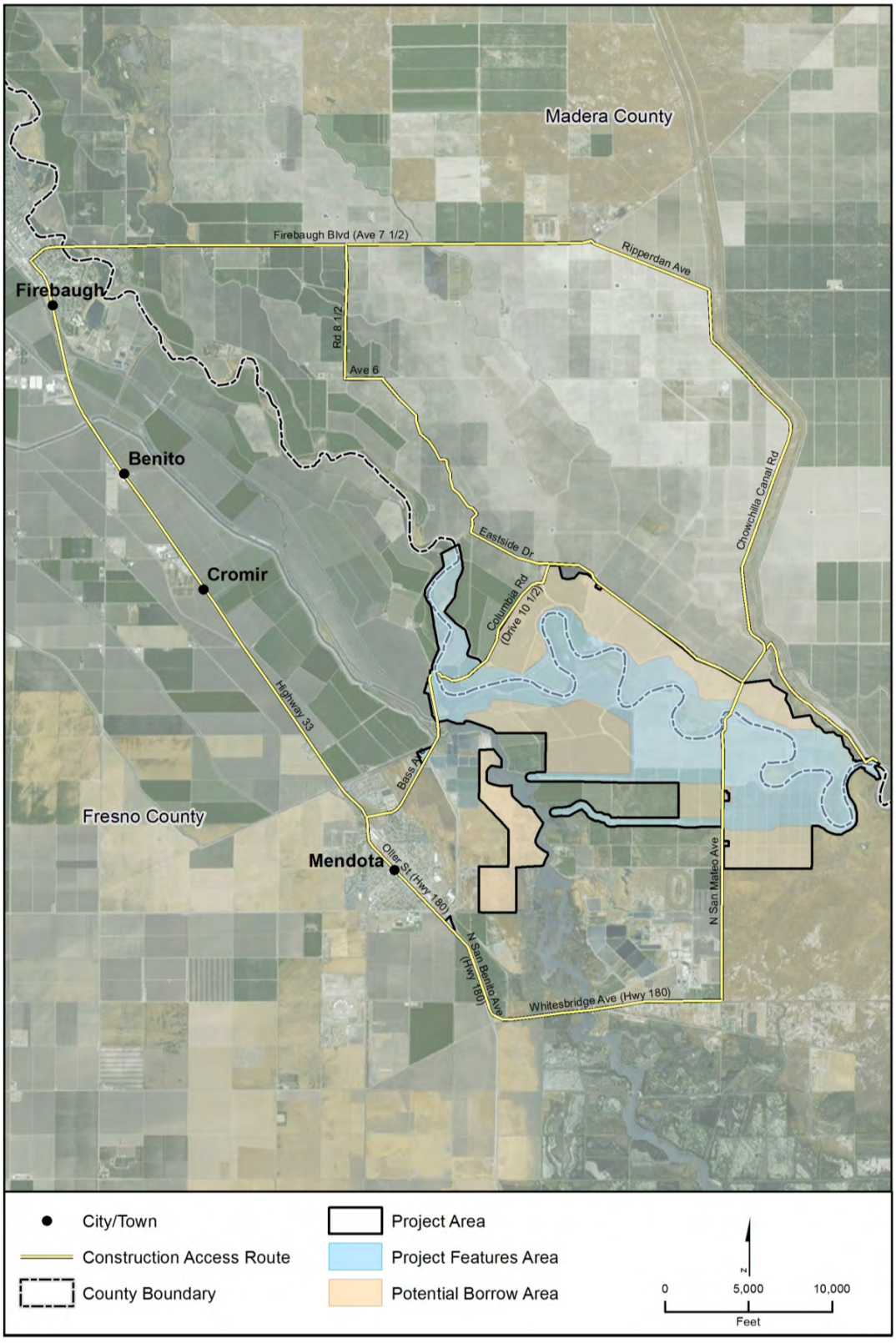


Figure 2-5.
Construction Access Routes

- Eastside Drive – Approximately 0.6 mile of dirt road starting at Road 10 ½ will likely require overlaying, and the implementation of dust control measures.
- Chowchilla Canal Road/Road 13 – Approximately 0.3 mile of road starting at Eastside Drive will likely require some overlaying and the implementation of dust control measures.
- San Mateo Avenue – Approximately 0.5 mile of gravel and 1.5 miles of oil-dirt road starting at the existing San Joaquin River levees will likely require some overlying and the implementation of dust control measures.
- Bass Avenue Canal Crossings – These crossings may need additional bracing and shoring to ensure that they will be able to support the load of the construction equipment and activities. All the construction equipment on Bass Avenue will be within the legal loads (see note below). This crossing is on the Fresno County replacement list.
- Delta-Mendota Canal Crossing – This crossing may need additional bracing and supports to ensure that it will be able to support the load of the construction equipment activities.

Dust control measures for non-paved roads could include the use of water trucks or dust palliative for dust control or gravel placement where necessary. Legal loads would be used on all roads, and once construction is completed, the roads would be returned to the same condition as they were prior to the Project.

Revegetation of Temporary Disturbance Areas

Areas temporarily disturbed during construction would be restored to their previous contours, if feasible, and then seeded with a native vegetation seed mixture to prevent soil erosion. Some areas, such as borrow areas, may not be feasible to restore previous contours, but these areas would be smoothed and seeded.

Operations and Maintenance

The Project includes long-term operations and maintenance of the proposed facilities and features as described below.

Maintenance

Levees will require maintenance for vegetation management, access roads, levee inspections, levee restoration, rodent control, minor structures, encroachment removal, levee patrolling during flood events, and equipment. Levee vegetation management includes equipment to drag or mow the levee banks or aquatic-safe herbicide applications. Maintenance of access roads includes replacing gravel or scraping and filling of ruts to keep the roads in good condition. Levee restoration includes restoring areas with erosion or settlement problems or adding armor. Rodent control includes setting traps with bait and periodically checking the traps. Minor structures maintenance includes repair or replacement of gates, locks or fences. Encroachment removal involves removing illegally dumped materials.

Floodplain maintenance includes vegetation management for invasive species, periodic floodplain and channel shaping to retain capacity and prevent fish stranding, and other

floodplain maintenance activities such as debris removal and repair of channel banks and bank protection measures.

San Mateo Avenue maintenance includes maintenance when flows overtop the road and annual maintenance to keep the crossing functional and ensure that it can meet fish passage requirements. These maintenance activities include cleaning the culverts of debris or sediment, clearing any debris from the roadway prior to opening after flows have receded, repairing the road sub-base, base, and gravel surfacing, and repairing or replacing minor structures. Minor structures maintenance includes replacing gate locks, painting gates, replacing lost or damaged signage, and lubricating gates.

Control structures and Fresno Slough Dam maintenance includes annual operating maintenance for control gates, lubricating the fittings, greasing and inspecting the motors, replacing parts and equipment, in-channel sediment removal in the structure vicinity, and cleaning the trash rack. Work needed for the radial gates includes inspection of gates and seals and periodic replacement of seals. Work needed for the trash rack includes periodic repair or replacement of components, inspecting for operation, and greasing and inspecting the motors.

Fish screen maintenance is needed to ensure that screens are functioning to NMFS standards and capable of diverting the required flow. Fish screens maintenance includes removing the screens for cleaning, replacing screens when needed, periodic repair or replacement of brush cleaning system components, periodic repair or replacement of trash rack components, inspection for operation, greasing and inspecting motors, and in-channel sediment removal in the structure vicinity.

Fish barrier maintenance is needed to ensure that the barrier is functioning to NMFS standards and capable of passing the required flow. Fish barrier maintenance includes periodic repair or replacement of screens, in-channel sediment removal in the structure vicinity, and debris removal.

Fish passage facility maintenance is needed to ensure that the passage facility is functioning to NMFS standards. Depending on the type of fish passage facility built, fish passage facility maintenance could include removing sediment and debris from the facility, in-channel sediment removal in the structure vicinity, inspection of gates and seals and periodic replacement of seals, periodic repair or replacement of weir gates, periodic repair or replacement of supplementary water system components, inspection for operation, greasing and inspecting motors, and replacement of riprap, grouting, boulders, large woody debris, or other “natural” features of the fish passage facility.

Seepage control measure maintenance is dependent on the type of measures implemented but could include activities such as periodic sediment removal and channel re-shaping for interceptor ditches, cleaning or flushing of interceptor drains, repair and replacement of pump parts for seepage wells and lift pumps, and vegetation management, berm restoration, and rodent control for seepage berms.

Levee and structure protection maintenance includes repair restoration of protection measures due to erosion or degradation and vegetation management.

Water diversion canal maintenance includes sediment removal and channel re-shaping.

Mendota Dam maintenance includes periodic minor upstream sediment removal in order to operate the Short Canal only.

Maintenance Schedule

All maintenance activities, when possible, would be timed to minimize the impacts to fish. Access and safety concerns are the main driver for timing of the maintenance activities, but can be scheduled around fish migration. Ultimately, the schedule may be impacted by compliance with the clearance to conduct the work and timing of flows.

Maintenance of levees and floodplains with aquatic-safe herbicide treatment would occur sometime between spring and fall and would depend on the plant species that are being treated. Typically the herbicide would be administered prior to the plant going to seed and may need to be sprayed more than once. Disking for vegetation management usually occurs twice within the year; once in early spring after the rainfall season and then again in late summer prior to plants going to seed. Access road and levee restoration work would likely be done in the summer after the rainfall season, and timing and projects would be dependent on environmental clearance for small mammals, nesting birds or burrowing owls, and other wildlife species. Rodent control would likely be done by a pest control advisor and would likely be done in the spring through fall and not during the rainfall season. All levee and floodplain work can be impacted by the presence of nesting birds, so in some areas work may not begin until the nesting birds have fledged or if there is some other biological reason to believe that the maintenance activities would not impact the nesting birds.

Timing of the maintenance of structures within the waterways would depend on the flow hydrograph and forecasted flows, but can typically be expected in the summer/fall after high spring flows have receded. Cleaning of the in-channel structures would typically occur when flows are low enough to allow crews and equipment to enter the river safely to access the structures. San Mateo Avenue may be cleared or repaired earlier for access as soon as flows recede and are not likely to increase for the remainder of the water year. If earlier, this work would only be for road access and would not be located in the channel itself.

Debris that collects on trash racks, screens, ladders, or other fish passage structures will need to be periodically removed but will likely be scheduled based on the operation permits for these structures. Annual maintenance cleaning would be expected after the fish migration, but will need to be timed when flows have receded.

Lubing and annual gate maintenance would likely be in the late summer or early fall prior to winter and spring flows to make sure the structures are operating properly and to provide time for repairs and ordering parts if needed.

For the Short Canal Option, the boards would be placed back into Mendota Dam. This could occur at any time, but would likely occur during the irrigation season (typically March through October). The fish passage structure at the dam would allow for fish passage when the boards are in-place.

Water diversion canals that require maintenance could be isolated from the river system by closing the headgates at the canals which will not impact fish migration.

Operations

There are no operations for levees, floodplains, or levee and structure protection.

San Mateo Avenue operations include closing the gates to the crossing during high flows and reopening once flows have receded.

Control structures and Fresno Slough Dam operations include operating the motors for the control gates, inspecting and assessing the gates, adjusting the gates for various stages of flows, and running the automatic trash sweep.

Fish screen operations could occur every day when diversions are occurring. Operations include visually inspecting screens, verifying flow, clearing obstructions and debris, adjusting the baffles, permitting and regulatory compliance measures, estimating performance (i.e., velocity measurements), powering the screen, running the pumps for the sediment removal system, running automatic brush cleaning and trash rake motors, and running pumps for the fish diversion pipe. Operations also could include methods to reduce predation of juvenile fish (e.g., noise systems to scatter predators, netting, and periodic draining of the screen return pipes) and may include the addition of juvenile and/or adult fish traps.

Fish barrier operations could occur every day during salmon upmigration for spawning. Operations include visually inspecting screens, verifying flow, clearing obstructions and debris, installing and removing barrier screens, and permitting and regulatory compliance measures.

Fish passage facility operations could occur every day during fish migration. Operations include visually inspecting the facility, verifying flow, clearing obstructions and debris, adjusting the weirs, permitting and regulatory compliance measures, estimating performance (i.e., velocity measurements), powering mechanically controlled weirs.

Seepage control measure operations are primarily passive, but seepage well operations would include running the pumps to lower the water table, and interceptor drain and ditch operations could involve running lift pumps.

There are no operations for the water diversion canal. Operation of the canal headworks is covered under control structures above.

Mendota Dam operations include placing and removing stop logs in order to operate the Short Canal (only applies to Alternative C [Fresno Slough Dam with Narrow Floodplain and Short Canal]; see Section 2.2.7).

Monitoring Activities

Monitoring activities would include physical and nonphysical activities within the Project area. Several monitoring components would be covered by the Program's *Physical Monitoring and Management Plan* (PEIS/R pages 2-49 to 2-52, and Appendix D.1, SJRRP 2011a), which provides guidelines for observing conditions as well as adjusting to changes in physical conditions within the Project area. The Program's *Physical Monitoring and Management Plan* consists of multiple component plans, addressing physical conditions such as flow, groundwater seepage, channel capacity, and propagation of native vegetation. Each component plan identifies objectives for the physical conditions within the Project area, and provides guidelines for the monitoring and management of those conditions. The component plans identify potential actions that could be taken to further enhance the achievement of the objectives. Finally, the Plan includes a description of monitoring activities which apply to one or more of the component plans. The component plans include the following monitoring objectives, all of which are identified in the Program's *Physical Monitoring and Management Plan*:

- **Flow** – To ensure compliance with the hydrograph releases in Exhibit B of the Settlement and any other applicable flow releases (e.g., buffer flows) (detail is provided in the Program's *Restoration Flow Guidelines*).
- **Seepage** – To reduce or avoid adverse or undesirable seepage impacts (detail is provided in the Program's *Seepage Management Plan*).
- **Channel capacity** – To maintain flood conveyance capacity (detail is provided in the Program's *Channel Capacity Report*).
- **Native vegetation** – To establish and maintain native riparian habitat.

Project specific components of the monitoring will include addressing effectiveness monitoring of fish screens and fish passage at structures within the Project area. The monitoring objective is the following:

- **Passage and screening effectiveness** – To maintain effective fish passage and fish screening at structures and diversions.

Monitoring activities, as they are described in the Program's *Physical Monitoring and Management Plan*, are guidelines for monitoring and could change during Project implementation. Monitoring activities in Reach 2B could include the following Program-level activities:

- **Flow monitoring** – Flow, cross sections, and surface water stage at gaging stations, and at additional locations during high-flow events.
- **Groundwater level monitoring** – Groundwater elevation in monitoring wells (detail is provided in the Program's *Seepage Management Plan*).
- **Aerial and topographic surveys** – True color aerial photographs and topographic surveys to assess river stage, hydraulic roughness, river width, bed elevation, and vegetation conditions.

- **Vegetation surveys** – Surveys of seed dispersal start and peak times, and native riparian vegetation establishment.
- **Sediment mobilization monitoring** – Sediment mobilization, bar formation, and bank erosion through aerial and topographic surveys of areas with elevated erosion potential (detail is provided in the Program's *Sediment Management Plan*).

Project specific monitoring activities will include the following:

- **Passage and screening effectiveness** – Flow, cross-sections, water surface, and velocity measurements near and within structures that provide passage or screening. Fish counting devices and rotary screw traps to count and measure fish passage and fish size.

Structure Design and Subsidence

All design work would be completed in general accordance with Reclamation Design Standards, applicable design codes, and commonly accepted industry standards. Where design criteria are missing for a specific project element, either Reclamation would be consulted for design specifications or standard engineering practice methods would be employed.

In addition, ground subsidence effects are anticipated to be experienced in the Project area. During the design process, causes of the observed subsidence, data from previously conducted studies, subsidence locations expected to require special design considerations, anticipated subsidence rates, and methods to mitigate the anticipated ground subsidence would be identified and incorporated into the design.

Land Acquisition

The approximate amount of additional lands to be acquired to accommodate the floodplain, levees, bypass channel, structures, and borrow was quantified based on parcel data in GIS shapefile format from Fresno and Madera counties. Since remaining portions of parcels that fall outside the Project area may not be as easily utilized by the land owners, the entire parcels were considered, where appropriate. The amount of land acquisition varies with alternative (approximately 2,450 to 3,300 acres).

Phased Implementation

The Project may utilize a phased approach to implementation of the selected alternative. Phased implementation would involve building selected components of the Project in separate construction phases, allowing Project funding to be secured over time. For example, the bypass channel and bifurcation structure could be built in a first phase, fish passage facilities in a second phase, and fish screens and levees and floodplain construction in a third phase. Exact phasing would be developed during the detailed design phase of the selected alternative.

2.2.5 Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A (Compact Bypass with Narrow Floodplain and South Canal) includes:

- Building levees capable of conveying flows up to 4,500 cfs with 3 feet of freeboard.
- Restoring floodplain habitat an average of approximately 3,000 feet wide to provide benefit to salmonids and other native fishes.
- Constructing a channel and structures capable of conveying up to 4,500 cfs of Restoration Flows around the Mendota Pool.
- Constructing the South Canal and structures capable of conveying up to 2,500 cfs from Reach 2B to Mendota Pool.
- Providing upstream and downstream fish passage for adult salmonids and other native fishes, and downstream fish passage for juvenile salmonids, between Reach 2A and Reach 3.

This alternative would construct a channel between Reach 2B and Reach 3, the Compact Bypass channel, in order to bypass the Mendota Pool. Restoration Flows would enter Reach 2B, flow through the reach, then downstream to Reach 3 via the Compact Bypass channel. A canal to convey San Joaquin River water deliveries to Mendota Pool, the South Canal, would be built. The San Joaquin River control structure at the Chowchilla Bifurcation Structure would be removed, and a bifurcation structure would be built at the head of the South Canal to control flood diversions into the Chowchilla Bypass and water delivery diversions into Mendota Pool. Fish passage facilities and a fish screen would be built at the South Canal bifurcation structure to provide passage around the structure and prevent fish being entrained in the diversion. A fish barrier would be built in Reach 3 to direct up-migrating fish into the Compact Bypass channel. A new crossing would be built at the San Mateo Avenue crossing. These features are described in further detail in the sections below. See Figure 2-6 and Figure 2-7 for a plan view of the alternative's features.

Compact Bypass Channel

The bypass channel would convey 4,500 cfs around the Mendota Pool by constructing a channel just southwest of the existing Columbia Canal alignment. Once constructed, the bypass channel would become the new river channel. This alternative includes excavating the bypass channel, constructing levees and in-channel structures, removing existing levees, relocating or modifying existing infrastructure, and acquiring land. The in-channel structures may include bifurcation control structures, grade control structures, fish screen(s), fish passage facility(ies), fish barrier(s), Columbia Canal Siphon, as well as the Drive 10 ½ realignment and are discussed under Structures. The bypass channel and associated structures would provide downstream passage of juvenile Chinook salmon and upstream passage of adult Chinook salmon, as well as passage for other native fishes, while isolating Mendota Pool from Restoration Flows.

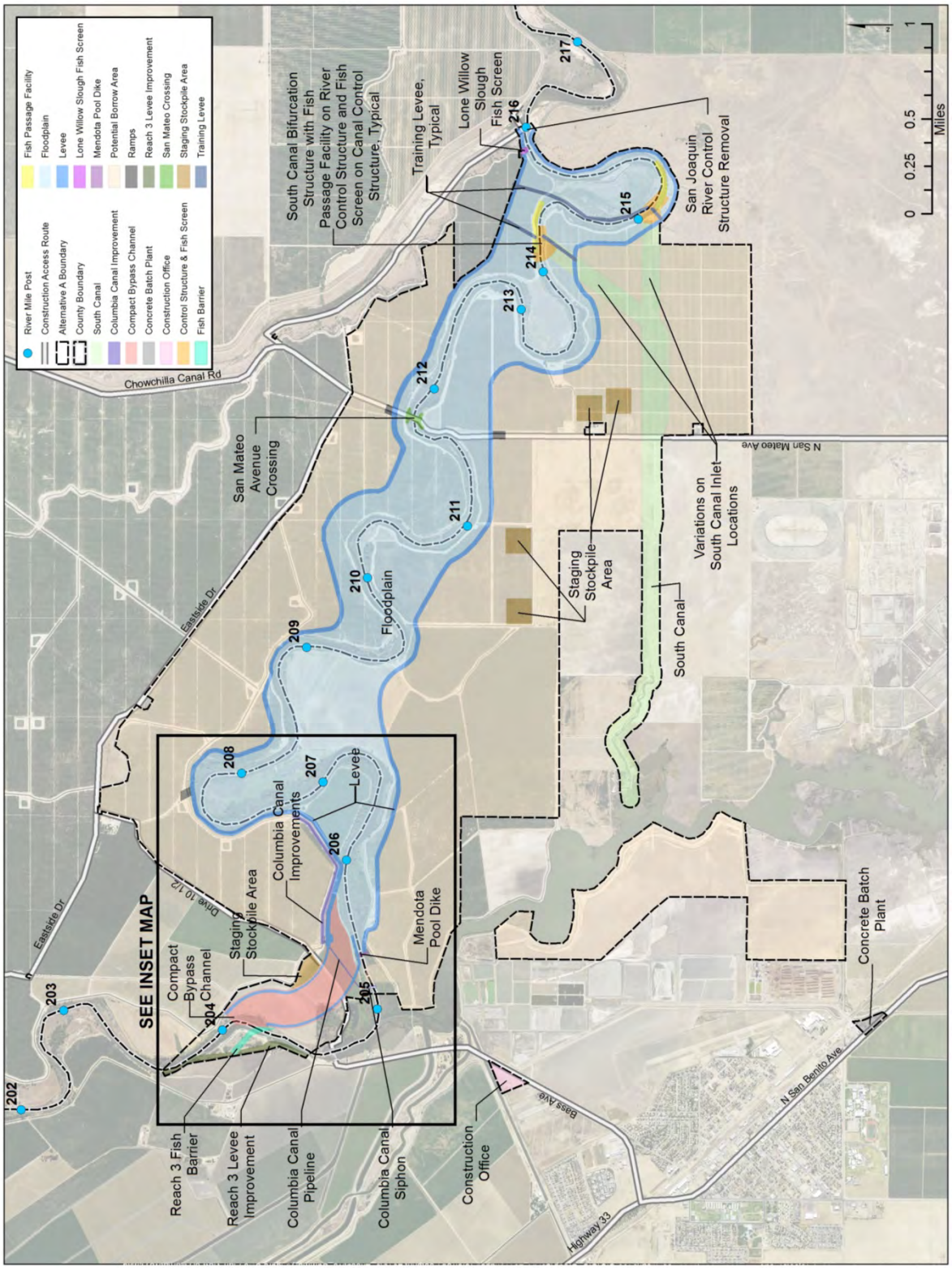


Figure 2-6.
Plan View of Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

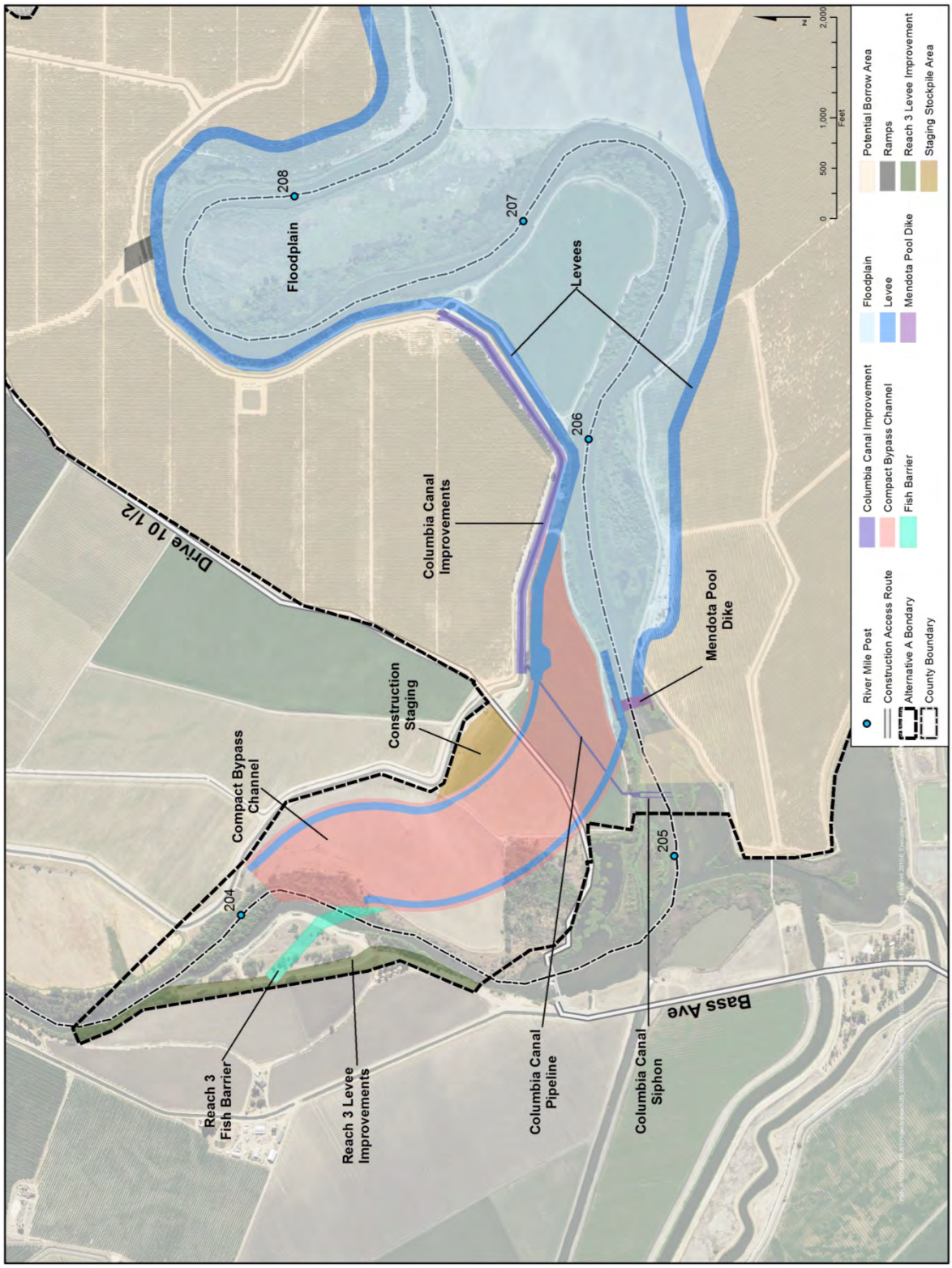


Figure 2-7.
Inset Map of Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

The bypass channel would connect to Reach 3 approximately 0.6 mile downstream from Mendota Dam (approximately RM 204), bypass the Mendota Pool to the north, and connect to Reach 2B approximately 0.9 mile upstream from Mendota Dam (approximately RM 205.5). The bypass channel would have a total length of approximately 0.9 mile. A siphon under the bypass channel would be constructed to connect the Columbia Canal to the Mendota Pool.

The bypass channel would be a multi-stage channel designed to facilitate fish passage at low flows, channel stability at moderate flows, and contain high flows. The low-flow channel would be designed for a capacity of around 200 cfs and would have a topwidth of approximately 110 feet and a depth of approximately 2 feet. The main channel would be designed for a capacity of around 1,860 cfs (approximately the 2-year annual peak Restoration Flow in Reach 2B) and would have an average topwidth of approximately 320 feet and total depth of approximately 6 feet. The floodplain bench would be designed with a shallow cross-slope (approximately 1 percent slope) to allow variable floodplain depths at flows between 1,860 cfs and 4,500 cfs. The channel design will be further refined during the final design process.

The channel, designed as an unlined earthen channel, would be approximately 5,300 feet long with a total corridor width of approximately 950 feet. The average slope of the channel between grade control structures would be approximately 0.0004 (approximately 2.1 feet/mile), while the total elevation drop would be approximately 12 feet including grade control structures. A series of grade-control structures would be included to achieve the necessary elevation change (see Grade Control Structures).

South Canal

The South Canal would deliver up to 2,500 cfs in water deliveries from the San Joaquin River to Mendota Pool. The South Canal could connect to the river at various locations, ideally on a straight section of the river or on the outside of bend. Two optional locations for the junction with the San Joaquin River are shown in Figure 2-6 at approximately RM 214.2 and RM 215. The South Canal would discharge into Fresno Slough via the Little San Joaquin Slough approximately 2.3 river miles south of Mendota Dam.

Water deliveries would be controlled at the upstream end of the South Canal by a bifurcation structure. The river control structure would have a fish passage facility for fish passage, and the canal control structure would have a fish screen to prevent entrainment. The control structures, fish screen, and fish passage facilities are discussed under Structures.

The South Canal could be concrete-lined or unlined. The unlined design would include maintained grasses in the channel. Either design would have a trapezoidal cross-section. The lined South Canal would have a top-width of approximately 90 feet, a total corridor width of approximately 180 feet (including levees and maintenance roads), and 2H to 1V side slopes on the canal banks and levees. The unlined South Canal would have a top-width of approximately 270 feet, total corridor width of approximately 490 feet (including levees and maintenance roads), and 3H to 1V side slopes on the canal banks and levees.

Levee heights would be based on a flow of 2,500 cfs and 3 feet of freeboard. Seepage control measures and erosion protection would be included as necessary to minimize seepage impacts and reduce erosion and scour in the canal. However, seepage is assumed to not be an issue for a lined canal, so seepage control measures would not be provided for the lined canal.

The South Canal would cross San Mateo Avenue, so a bridge crossing would be provided to maintain access. The bridge would include concrete deck, reinforcing steel, piles, and pile extensions, railing, excavation, and backfill.

Structures

The structures described below would be required to provide the operational flexibility to divert water to the Mendota Pool, provide fish passage, allow maintenance access to Mendota Dam, prevent fish entrainment and straying, and provide controlled elevation drop between Reach 2B and Reach 3.

San Joaquin River Control Structure at Chowchilla Bifurcation Structure Removal

The existing Chowchilla Bifurcation Structure consists of two control structures: one at the head of the Chowchilla Bypass and one across the San Joaquin River at RM 216. With the inclusion of a bifurcation structure at the head of the South Canal, a new control structure would be built across the San Joaquin River at the head of the canal. The new control structure would alleviate the need for the San Joaquin River control structure at the Chowchilla Bifurcation Structure because all diversions into the Chowchilla Bypass could be controlled from the new control structure at the head of the South Canal. As part of this alternative, the San Joaquin River control structure at the Chowchilla Bifurcation Structure would be demolished.

South Canal Bifurcation Structure

A bifurcation structure would be constructed at the upstream end of the South Canal. The bifurcation structure consists of two control structures: one across the path of Restoration Flows (San Joaquin River) and one across the path of water deliveries to Mendota Pool (South Canal).

The control structure across the path of the Restoration Flows would be designed to accommodate up to 4,500 cfs and consists of six 20-foot-wide bays for a structure length of approximately 140 feet. Conditions in this control structure would be designed based on NMFS 2001 and NMFS 2008 fish passage criteria. The control structure across the path of the water deliveries would be designed to accommodate up to 2,500 cfs and consists of four 20-foot-wide bays for a structure length of approximately 100 feet. Flow through each bay would be controlled by a gate (e.g., radial (Tainter) or inflatable Obermeyer). In the final design, the number and size of the gates may be modified. The size of the gates would be determined by the design maximum flow.

The Restoration Flow path structure includes a fish passage facility on the side of the structure, and the water deliveries flow path structure includes a fish screen upstream of the structure. Each control structure would be placed in the middle of the channel and has earthen embankments connecting the structure to the proposed levees. The connector

embankments would be similar in height to the surrounding San Joaquin River levees. The connector embankments may include culverts, gates, weirs, inflatable bladder dams, or other features to improve flow and fish passage on the floodplain when water deliveries are not occurring. A 16-foot-wide roadway and 20-foot-wide maintenance/operations platform would be provided over each control structure.

The bifurcation structure would be used to control flow to the river, to the canal providing water deliveries to Mendota Pool (South Canal), and to the Chowchilla Bypass. Flow would be backwatered in the upper portion of Reach 2B above the canal bifurcation structure to operate the Chowchilla Bypass. Therefore, San Joaquin River levee heights would be increased over that segment of Reach 2B, particularly near the canal bifurcation structure.

South Canal Fish Passage Facility

The South Canal bifurcation structure would include a fish passage facility on the side of the control structure across the Restoration Flow path. The fish passage facility would be necessary to provide passage during water deliveries and for Restoration Flows where passage conditions through the control structure may not be ideal.

Passage Facility Design

The design of the fish passage facility would be based on criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2008). The size and geometry of the fish passage facility would be dictated by the flow requirements for juvenile and adult fish in Table 2-1. Several types of fish passage facility may be considered in detailed design: vertical slot weir ladder design was included for its ability to accommodate a greater range of water depths (hydraulic head at the upstream and downstream ends), but the design may also consider ice-harbor, pool and chute, rock ramp fishway or other passage facility designs.

A roadway would need to be built over the fish passage facility to connect the maintenance road atop the river control structure with the levee road on the south side of the river. The roadway would be supported by the vertical concrete walls of the fish passage facility or other structural features.

Attraction Flows

The attraction flow magnitude will be 5 to 10 percent of the total flow through the control structure over the path of Restoration Flows. The Project requires conveyance of at least 4,500 cfs, so the attraction flow at the passage facility entrance could be as high as 450 cfs. The passage facility itself may have a design flow rate less than the maximum attraction flow. In this case, the balance of attraction flows could be provided at the passage facility entrance (downstream side) through supplementary water, described below.

Supplementary Water

Supplementary water, if incorporated into the facility, is water already in the river and which is piped to the fish passage facility entrance to augment attraction flows. No additional water supply beyond what would be flowing in the river is required. The

supplementary water allows the passage facility to operate under a wider range of river flows by supplying additional attraction flow when the need exceeds the design flow rate through the passage facility. Supplementary water would also be used to control the hydraulic head at the passage facility entrance.

Supplementary flow would be collected by a water delivery intake structure located upstream from the fish passage facility (see Figure 2-8). The intake structure would include an automated cleaning system, trash rack and a fish screen to prevent migrating fish from entering the intake. River water would enter the intake structure, and travel downriver through pipes to the passage facility entrance.

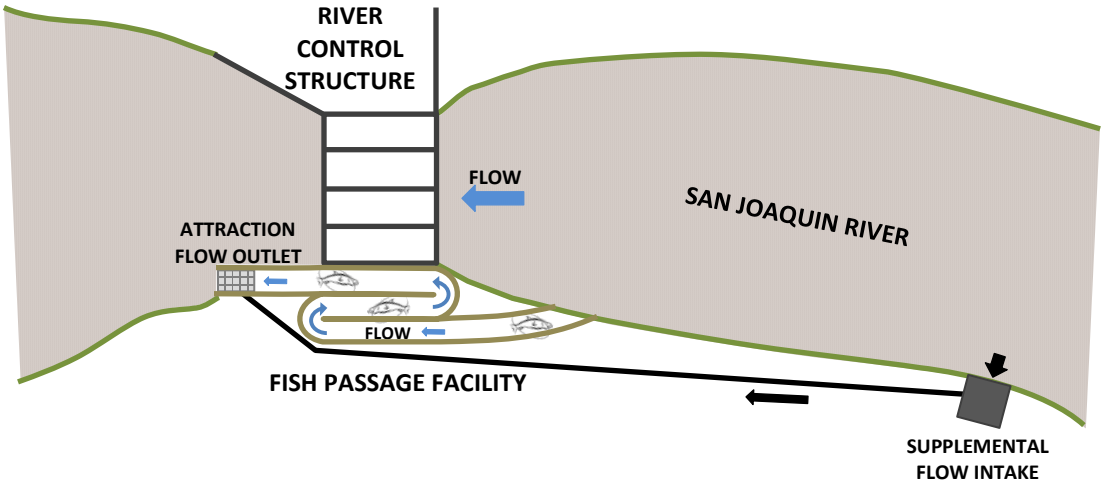


Figure 2-8.
Supplementary flow system plan-view diagram

South Canal Fish Screen

A fish screen would be included at the head of the South Canal where water deliveries would be diverted from the river toward Mendota Pool. The fish screen would be necessary to keep or return out-migrating juvenile salmon to the San Joaquin River (the path of Restoration Flows) during water deliveries.

The screen would be designed to pass flow up to 2,500 cfs. The type of fish screen could be a fixed flat plate in "V" configuration, vertical flat plate, inclined flat plate, cone, or cylindrical screens. Depending on the design type, the fish screen facility may include trash racks, stainless steel wedge wire fish screens, flow control baffle systems behind the screens, screen cleaning systems for the trash racks and screens, bypass flow control weirs, fish-friendly pumps, and/or fish bypass pressure pipelines. The trash racks would be installed at the entrance to the screen structures to protect screens from trash, logs, and other large debris.

Approach, sweeping, and bypass entrance velocities would be kept within established fish screen criteria (NMFS 2008). Flow through the fish screens may be controlled by baffles behind the fish screens. Cleaning of the screens would be accomplished using an

automated brush system. Electric power would be needed for fish friendly pumps, if included, and screen cleaning systems. Operation of the fish screens would include methods to reduce predation of juvenile fish (e.g., noise systems to scatter predators, netting, and periodic draining of the screen return pipes).

San Mateo Avenue Crossing Replacement

The San Mateo Avenue crossing is an existing river crossing located within a public right-of-way in Madera County and on private land in Fresno County at approximately RM 211.8. The crossing transitions from public right-of-way to private land at the center of the river. In order to maintain vehicular access, accommodate increased flow magnitudes associated with Restoration Flows, and provide fish passage, an improved crossing would be included with this alternative. The crossing would accommodate the increased flows in the river by maintaining the required velocities for proper fish passage for flows up to 4,500 cfs. The crossing would be designed to meet NMFS 2001 and NMFS 2008 passage criteria. When flow is within the capacity of the culverts (e.g., less than 1,500 cfs), fish passage would occur in the culvert. The crossing would be overtopped during higher flows.

The proposed San Mateo Avenue crossing includes installing a low flow or dip crossing with multiple, counter-sunk concrete box culverts designed for highway loading. The structure includes armoring along the entrance and exit of the structure as well as along the channel banks in the immediate vicinity of the structure. The armoring would be necessary to protect the structure during overtopping flows. Culverts would be embedded below the existing channel bed. Grouted riprap would be placed in the culvert below the existing channel bed to prevent channel scour reaching the floor of the culvert and to create a roughened boundary layer for fish passage. Native bed material would be placed above the grouted riprap up to the existing channel bed elevation to provide passage conditions similar to that which exists in the adjacent natural stream.

Mendota Pool Dike

Adjacent to the head of the Compact Bypass, a dike across the existing river channel would be needed to prevent water in Mendota Pool from flowing into the Compact Bypass. The dike would be of similar design as the levees in Section 2.2.4 including seepage control measures to prevent seepage from the Pool into the Compact Bypass. The dike would run from the proposed Reach 2B levee on the south side of the river, across the river, to proposed left-bank levee of the Compact Bypass. This structure would likely be regulated by DWR Division of Safety of Dams (DSOD).

Drive 10 ½

The Compact Bypass would cross existing Drive 10 ½, which provides access to the east side of Mendota Dam. With this alternative, the road would end at east side of the bypass channel and would not continue to Mendota Dam.

Reach 3 Fish Barrier

A fish exclusion barrier would be included in Reach 3 near the downstream end of the Compact Bypass to prevent adult fish from migrating beyond the bypass channel up to the base of Mendota Dam, which during most flows out of Mendota Pool, would be a

dead end for fish passage. This would lead to delays in adult salmon migration or potentially death. Although out-migrating fish would not be expected to be present downstream from Mendota Dam, the fish barrier would allow juveniles to pass the structure.

The exclusion barrier design would be a high-flow picket barrier, which is a flow-through structure of closely spaced bars (i.e., pickets) that prevent adult fish from traveling upstream in the river to Mendota Dam at flows up to a combined discharge of 4,500 cfs (Mendota Dam and the Compact Bypass). The design accounts for a range of flow options from routing the entire 4,500-cfs flow through the structure (flood flows from the James Bypass), to routing a 600-cfs irrigation delivery through the structure with up to 3,900 cfs being routed down the Compact Bypass, to routing no flow through the structure with up to 4,500 cfs down the Compact Bypass.

The total length of the structure would be approximately 1,410 feet, with 260 feet across the main channel and 1,150 feet across the overbanks. The base of the structure would consist of a concrete sill connected to concrete piles, which extend into clay layers. The structure would be approximately 20 feet high in the main channel and 9 feet high in the overbanks. Riprap would be placed 2 feet thick at the entrance and exit of the sill to prevent erosion. The fish barrier meets the average through-velocity criteria of 1.0 foot per second (fps) in *Anadromous Salmonid Passage Facility Design* (NMFS 2008).

In order to meet velocity criteria for the structure, some floodplain grading between the existing Reach 3 levees would be required to provide even flow-through conditions. In addition, approximately 4,200 linear feet of improvements to the Reach 3 left-bank levee are included to ensure that backwater conditions at the structure do not affect adjacent property. The improved Reach 3 levee would have the same alignment as the existing levee.

Grade Control Structures

A series of several (10 to 18), approximately 0.5-foot-high grade-control structures would be included within the bypass channel to achieve the necessary elevation change between Reach 2B and Reach 3. The grade control could be provided by structures such as sheet pile weirs or constructed rock riffles.

Rock riffles have benefits for native fish migration, but they present construction challenges in the sandy substrate of the Reach 2B and Reach 3 area. The flow over constructed rock riffles may reduce the disorienting effects on juveniles from rapidly changing hydraulics otherwise created at weir structures, and they are more favorable to sturgeon, which do not jump. Constructed rock riffles may be less favorable to predators which can hold in the quiescent pools below weir structures. However, placing rock in sandy substrate requires engineered foundation materials (layers of rock in gradually decreasing sizes) to prevent undermining the structure. Further analysis during design will determine which type of grade control structure will be selected.

Sheet pile weirs would be constructed with capped and anchored sheet piles. Caps on the sheet piles would be used to avoid injuring fish and can be surfaced with natural

materials (i.e., grouted rock) to emulate natural conditions which fish may be exposed to in non-manmade portions of the San Joaquin River.

Each grade control structure would extend across the main channel and key into the overbanks to protect against flanking, resulting in a total structure width of about 420 feet.

Vegetated revetment would be included along both channel banks within the portion of the bypass containing the grade control structures to provide additional protection against flanking. It is assumed that the revetment would consist of buried riprap covered with topsoil, erosion control fabric, and native woody vegetation, so that fish would experience natural channel banks. Native woody vegetation directly upstream, downstream, and adjacent to the grade control structures would provide shading and opportunities for juveniles to hide from predators.

Fish Habitat and Passage

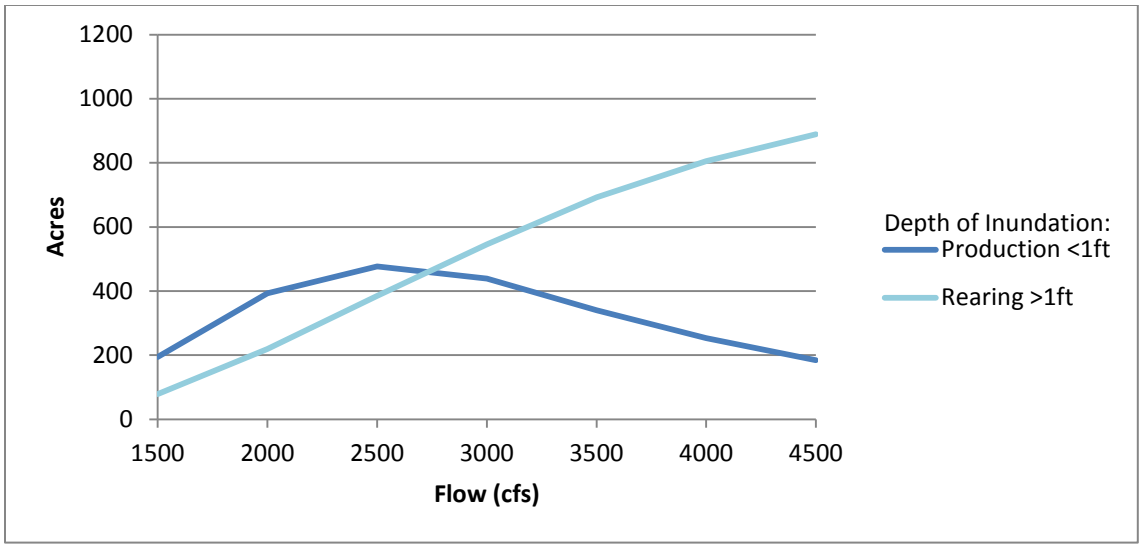
The purpose of the floodplain would be to provide riparian and floodplain habitat and support the migration and seasonal rearing of salmonids and other native fishes in Reach 2B. The floodplain has an average width of approximately 3,000 feet and an inundated area of approximately 850 acres at 2,500 cfs.

This alternative provides floodplain habitat resulting in approximately 450 acres of shallow water habitat for primary production[3] as well as approximately 400 acres of habitat that supports direct rearing[4] at 2,500 cfs. Approximately 55 percent of the floodplain in this alternative would inundate less than 1 foot deep at 2,500 cfs. This alternative also retains approximately 200 acres of shallow water habitat at flows up to 4,500 cfs.

Figure 2-9 below presents conceptual inundation areas for primary production and rearing habitats as they vary by flow. Inundation acreages may change during the design process.

[3] Primary production is defined as the production of organic compounds from atmospheric or aquatic carbon dioxide, principally through the process of photosynthesis. The organisms responsible for primary production are known as primary producers or autotrophs, and form the base of the food chain (e.g., algae). Primary production also includes aquatic invertebrate species that feed on algae and are a food source for fish.

[4] Rearing habitat is defined as those areas with characteristics that support growth and maturation of juvenile salmonids prior to their outmigration as smolts. For the purpose of analysis, juvenile salmon direct rearing habitat is the area with water greater than 1.0 feet deep at 2,300 cfs, a flow which will occur in approximately one out of every 2 years for a sustained period of at least 20 days in the period March 15 to May 15 (see further discussion in the Project Description TM Attachment A – Alternatives Evaluation, Section 6.2.2 (SJRRP 2012). The modeled flow of 2,500 cfs is used as a surrogate for 2,300 cfs.



Source: Tetra Tech 2012

Figure 2-9.
Potential Inundation Acreage by Flow for Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

In the Compact Bypass channel, floodplain benches with an approximate average width of 300 feet on each side the main flow portion of the bypass channel are included (see section "Compact Bypass Channel.") Riparian and floodplain habitat would develop on the benches in the bypass channel to benefit migrating fish and promote a stable channel and sediment transport from Reach 2B to Reach 3.

This alternative includes several facilities that fish may encounter or need to pass to migrate between Reach 3 and Reach 2B (from downstream to upstream):

- A fish barrier near the downstream end of the Compact Bypass.
- Several (10 to 18) in-channel grade control structures in the Compact Bypass.
- The San Mateo Avenue crossing.
- Four fish screen return outlets from the South Canal fish screen.
- A bifurcation control structure at the South Canal with fish passage facility.
- A fish screen near the upstream end of the South Canal.
- Fish screens at Lone Willow Slough, Big and Little Bertha pumps, and other smaller diversions (these screens are discussed in Section 2.2.4).

Each structure would be designed to perform according to the fish passage design criteria (see Section 2.2.4). In addition, the channel and floodplain incorporate riparian plantings to provide cover, woody material, and velocity variability, while the design footprint allows sufficient space to incorporate channel structure variability during detailed design, all of which may help to reduce stress and predation.

This alternative includes a fish barrier at the downstream end of the bypass channel to keep fish from migrating into false migration pathways. Without the barrier, a false migration pathway up to the base of Mendota Dam would be available to fish in all years, and a false migration pathway into Mendota Pool and Fresno Slough (potentially into the King River system) would occur in about one in five years, when the boards are taken out of Mendota Dam to pass Pine Flat flood releases into Reach 3. However, with the barrier, which would be designed to accommodate flows up to 4,500 cfs, fish would not be able to migrate to Mendota Dam or enter Mendota Pool, but they would be guided into the bypass channel and Reach 2B.

Floodplain and Riparian Habitat

This alternative includes passive riparian habitat restoration and compatible agricultural activities in the floodplain. It is assumed that over time wetland communities (obligate, facultative-wet, and facultative species) would develop within the main channel and that a dense riparian scrubland would develop along the main river channel banks. Between the main river channel banks and the proposed levees, agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) could occur.[5] The Restoration Flows would be used to recruit new vegetation along the channel. This alternative relies upon existing seed banks (upstream of the Project and on portions of existing Reach 2B levees to remain) and Restoration Flows for vegetation recruitment, and no supplemental water supply is required. Invasive, non-native species would be removed from the channel and riparian areas during or following construction, and the Project would include long-term management for invasive plants.

Several native vegetation alliances may develop in the riparian areas, such as saltgrass flats, sandbar willow thickets, California mugwort brush, black willow thickets, riparian bank herbs, California bulrush marsh, buttonwillow thickets, Oregon ash groves, creeping rye grasslands, and Fremont cottonwood forests.

Existing Native Vegetation Protection

The existing native vegetation in the Project area designated to remain would be temporarily fenced with orange snow fencing (or equivalent) to prevent entry, driving, parking, or storing equipment or material within these areas during construction. Existing vegetation would be left in place or only minimally trimmed to facilitate access and work at the site. The existing soil is an ideal growing medium for all the desired native plants. In order to maximize plant growth and planting success, existing soil and topsoil would be preserved unless the soil contains invasive non-native seed or fragmented stems and rhizomes, in which case it should not be preserved. Disturbance during construction would be minimized to the maximum practicable extent.

Invasive Species Control

Invasive, non-native species would be removed from the Project area during the construction phase. Invasive species management would consist of removal of the most invasive non-native species within the reach such as giant reed grass (*Arundo donax*),

[5] Rearing on floodplains with agricultural practices has been shown to be compatible with salmon rearing, and provide faster salmon growth rates compared to in-channel rearing alone (Sommer et al. 2001).

perennial pepperweed (*Lepidium latifolium*) and poison hemlock (*Conium maculatum*). Invasive species management would also include removal of other invasive species that are currently found in upstream reaches and may eventually colonize in the Project area such as red sesbania (*Sesbania punicea*), salt cedar (*Tamarix* species), and Chinese tallow (*Sapium sebiferum*). Invasive plant removal techniques may include mechanical removal, root excavation, hand pulling, mowing, disking, controlled burning, grazing, aquatic-safe herbicides, or a combination of techniques as appropriate.

Long-Term Management

While it is not anticipated that major management actions would be needed, the key objective of long-term management would be to monitor and identify any environmental issues that arise, and use adaptive management to determine what actions would be most appropriate to correct these issues.

The general management approach to the long-term maintenance of the floodplain areas would be to maintain quality habitat for each natural resource, on-going monitoring and maintenance of key environmental characteristics of the entire floodplain area within the reach. An adaptive management approach would be used to incorporate changes to management practices, including corrective actions as determined to be appropriate by Reclamation and/or CSLC. Adaptive management includes those activities necessary to address the effects of climate change, fire, flood, or other natural events, force majeure, etc.

The expected long-term management needs and activities necessary to maintain any on-site mitigation sites would be resource specific long-term maintenance activities and other general maintenance activities such as exotic species elimination, grazing management, clean-up and trash removal, infrastructure management such as gate, fence, road, culvert, signage and drainage-feature repair, and other maintenance activities necessary to maintain the riparian and floodplain habitat quality.

Water Deliveries

This alternative includes the South Canal for making up to 2,500 cfs in water deliveries from the San Joaquin River to Mendota Pool. Water deliveries to the Pool would include diversion of Friant Dam releases that are meant to satisfy the Exchange Contract as well as diversion of San Joaquin River flood flows if there is demand in Mendota Pool.

When water deliveries occur, the gates at the South Canal bifurcation structure would be manipulated to control flows into the downstream river channel and allow flows into the South Canal. To create sufficient hydraulic head to allow water to flow into the canal, operation of the gates would include backwatering a small portion of the San Joaquin River upstream of the South Canal bifurcation structure. The extent of the backwater is anticipated to be small and dependent on the design slope of the canal. Up-migrating fish passage along Reach 2B would occur through the South Canal fish passage facility during water deliveries. The South Canal fish screen would capture out-migrating fish entering the diversion and return them to the river. Some flow in the downstream river channel would be maintained during water delivery operations during fish migration periods.

Construction Considerations

The total construction timeline for this alternative is estimated to range approximately from 102 to 132 months (8.5 to 11 years); opportunities to shorten the overall schedule through construction efficiencies will be studied during the detailed design process.

Soil improvements for possible liquefiable soils may be required to protect proposed structures from damage or failure during an earthquake. All proposed structures would be designed to account for potential liquefaction. Soil improvements could include removing and replacing soils with adequate materials, injecting soil-cement slurry, vibrofloatation, dynamic compaction, structural foundation piles (stone or reinforced concrete), and other techniques.[6]

Flow in the San Joaquin River, operations at the existing Mendota Dam, and operation of the existing Columbia Canal must be maintained during construction. The majority of the Compact Bypass channel would likely be constructed without interruption to the San Joaquin River flow or the Columbia Canal.

The construction of the control structure across the existing river channel would require removable cofferdams in three phases to facilitate the construction without blocking the flow. If flow is present in the river during the construction period, flow would be diverted around the work area via a temporary diversion pipe or canal and fish passage would be provided. Cofferdams include two rows of braced sheet piling filled with dirt for stability and seepage control. The total height of the cofferdam is assumed to be 24 feet of which 12 feet would be above the channel bed. The control structures to be constructed on dry land (e.g., head of the South Canal) would not require cofferdams.

Stone slope protection (riprap) would be provided on the upstream and downstream slopes of the control structure embankment including some portions of the side slopes of the channel itself to prevent scouring. Riprap would be placed on bedding over geotextile fabric.

Construction of the fish screen and return/bypass fish pipes would take place in the dry using conventional construction methods and must be coordinated with construction of the water delivery canal. The exception to this is the outlet for the fish return pipes, which would require a cofferdam. All fish facility structures and pipes with surfaces exposed to fish require additional attention to surface-smoothness.

For construction of the control structures and fish passage facilities, it would be desirable to maintain a minimum flow during construction; the amount or range of flows during construction has not yet been identified. A sheet pile cofferdam would be provided for the river control structure and/or the canal control structure and the water diverted away from the construction. Additional sheet piling would be provided to divert flows through the new bifurcation structure while the fish passage facility is constructed.

[6] Vibrofloatation uses a vibrating probe that penetrates the soil and causes the grain structure to collapse and increase the density of the soil. Dynamic compaction involves dropping a heavy weight onto soil to compact it.

Cofferdams would likely be required around portions of the construction site at the San Mateo Avenue crossing. Since a portion of the existing crossing is private (not a public road), it was assumed that access could be closed during construction. Construction would be timed so that the lesser Restoration Flows (5 to 195 cfs) can be routed around the structure during construction. At high flows water would flow over the structure, in addition to through the proposed culverts. To protect the structure during high flows, the proposed fill would be enclosed in concrete and cutoff walls and riprap would be included to prevent damage to the structure during over topping flows.

Summary

Table 2-2 summarizes the levees, relocations, land acquisition, and construction schedule associated with Alternative A (Compact Bypass with Narrow Floodplain and South Canal) based on design, field, and evaluation criteria data prepared for the EIS/R.

Table 2-2.
Alternative A (Compact Bypass with Narrow Floodplain and South Canal)
Levees, Relocations, and Land Acquisition

	Left Levee	Right Levee
Levee Length	8.7 miles	7.1 miles
Average Levee Height	5.8 feet	5.4 feet
Fill Volume	345,200 cubic yards	269,700 cubic yards

Relocations			
Electrical Distribution	43,500 feet	Barn/Shed	1
Gas Transmission	10,000 feet	Facility	1
Water Pipeline	31,000 feet	Groundwater Well	26
Canal	32,500 feet	Lift Pump	10
Culvert	1	Power Pole	144
Diversion	3	Dwelling	2

Land Acquisition and Construction Schedule	
Land Acquisition[1]	2,700 acres
Time to Build[2]	132 months

[1] Total acreage includes areas that are sovereign and public trust lands.

[2] Construction timeline does not include the time that would also be needed to complete the NEPA/CEQA documentation process, obtain permits, appraise and acquire land, and perform pre-construction surveys.

2.2.6 Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure) includes:

- Building levees capable of conveying flows up to 4,500 cfs with 3 feet of freeboard.
- Restoring floodplain habitat an average of approximately 4,200 feet wide to provide benefit to salmonids and other native fishes.

- Constructing a channel and structures capable of conveying up to 4,500 cfs of Restoration Flows around the Mendota Pool.
- Constructing structures capable of conveying up to 2,500 cfs from Reach 2B to Mendota Pool.
- Providing upstream and downstream fish passage for adult salmonids and other native fishes, and downstream fish passage for juvenile salmonids, between Reach 2A and Reach 3.

This alternative would construct a channel between Reach 2B and Reach 3, the Compact Bypass channel, in order to bypass the Mendota Pool. Restoration Flows would enter Reach 2B at the Chowchilla Bifurcation Structure, flow through Reach 2B, then downstream to Reach 3 via the Compact Bypass channel. The existing Chowchilla Bifurcation Structure would continue to divert San Joaquin River flows into the Chowchilla Bypass during flood operations, and a fish passage facility and control structure modifications would be included at the San Joaquin River control structure at the Chowchilla Bifurcation Structure. A bifurcation structure would be built at the head of the Compact Bypass channel to control diversions into Mendota Pool. Fish passage facilities would be built at the Compact Bypass bifurcation structure to provide passage around the structure. The existing crossing at the San Mateo Avenue would be removed. These features are described in further detail in the sections below. See Figure 2-10 and Figure 2-11 for a plan view of the alternative's features. Elements that are common to all alternatives (described in Section 2.2.3) would be implemented under Alternative B.

Compact Bypass Channel

The bypass channel would convey 4,500 cfs around the Mendota Pool by constructing a channel just southwest of the existing Columbia Canal alignment. Once constructed, the bypass channel would become the new river channel. This alternative includes excavating the bypass channel, constructing levees and in-channel structures, removing existing levees, relocating or modifying existing infrastructure, and acquiring land. The in-channel structures include the bifurcation control structure, grade control structures, fish screen, fish passage facility, Columbia Canal Siphon, as well as the Drive 10 ½ realignment and are discussed under Structures. The bypass channel and associated structures provide downstream passage of juvenile Chinook salmon and upstream passage of adult Chinook salmon, as well as passage for other native fishes, while isolating Mendota Pool from Restoration Flows.

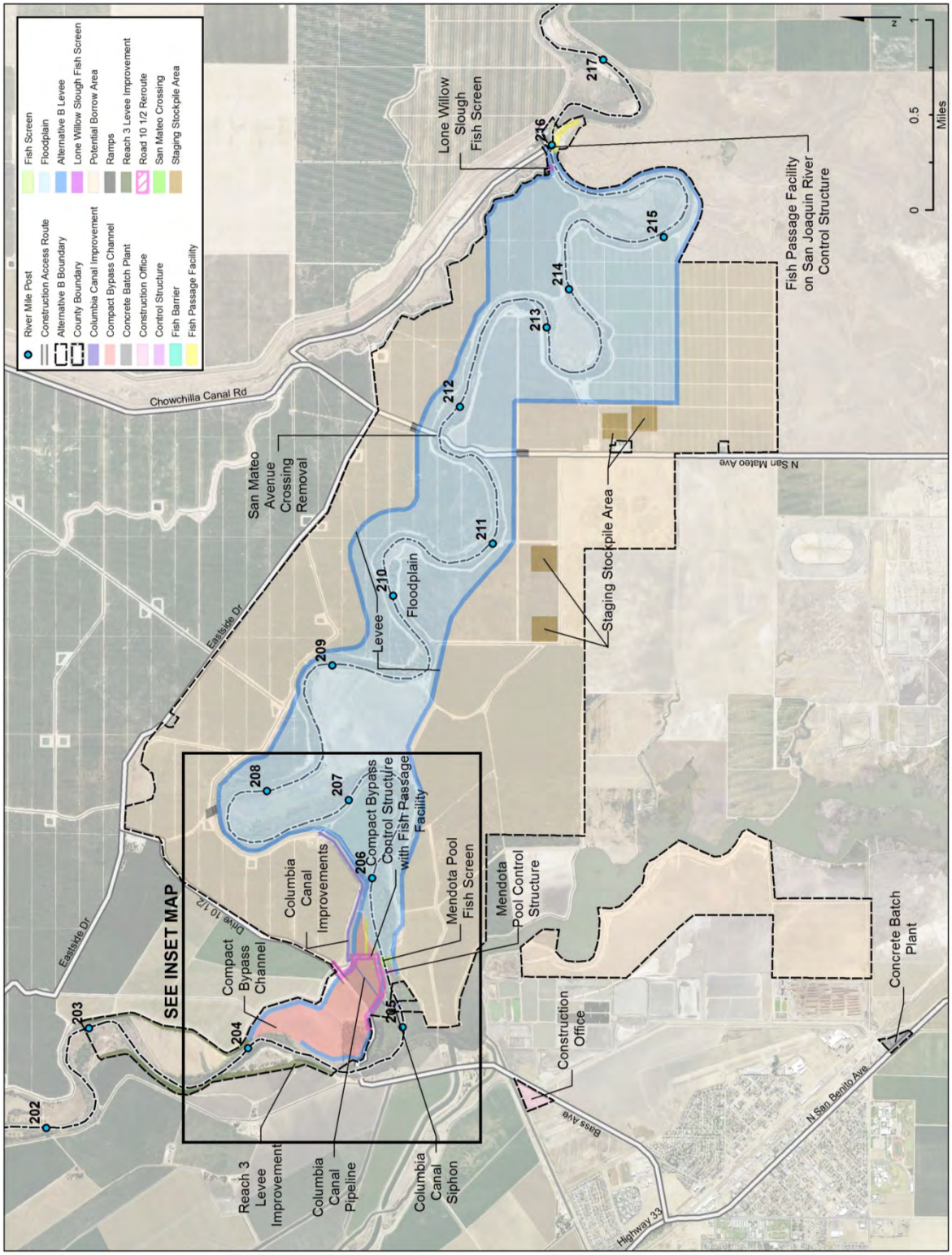


Figure 2-10.
Plan View of Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure)

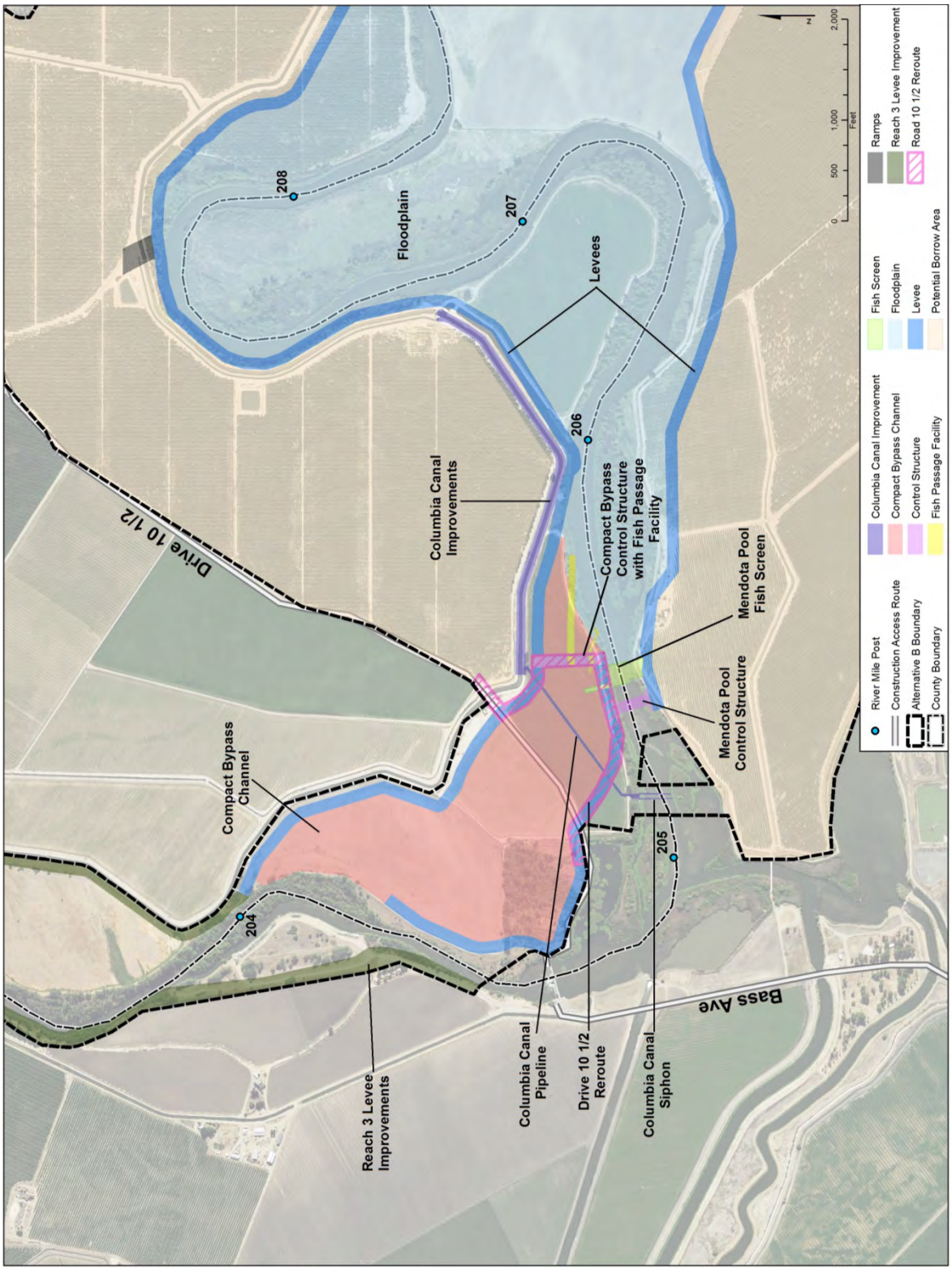


Figure 2-11.
Inset Map of Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure)

The bypass channel would connect to Reach 3 approximately 0.6 mile downstream from Mendota Dam (approximately RM 204), bypass the Mendota Pool to the north, and connect to Reach 2B approximately 0.9 mile upstream from Mendota Dam (approximately RM 205.5). The bypass channel would have a total length of approximately 0.9 mile. A siphon under the bypass channel would be constructed to connect the Columbia Canal to the Mendota Pool.

The bypass channel would be a multi-stage channel designed to facilitate fish passage at low flows, channel stability at moderate flows, and contain high flows. The low-flow channel would be designed for a capacity of around 75 cfs and would have a topwidth of approximately 50 feet and a depth of approximately 1 to 2 feet. The base flow channel would be designed for a capacity of around 200 cfs and would have a topwidth of approximately 70 feet and a depth of approximately 3 feet. The main channel would be designed for a capacity of around 1,500 cfs and would have an average topwidth of approximately 190 feet and total depth of approximately 5 feet. The floodplain bench would be approximately 150 feet wide on average on both sides of the main channel and designed with a shallow cross-slope (approximately 1 percent slope) to allow variable floodplain depths at flows between 1,500 cfs and 4,500 cfs.

The channel, designed as an unlined earthen channel, would be approximately 5,300 feet long with an average total corridor width of approximately 1,150 feet. The total elevation drop would be approximately 3 to 7 feet including grade control structures. A series of grade-control structures would be included to achieve the necessary elevation change (see Grade Control Structures). Channel complexity will be incorporated as appropriate per the Rearing Habitat Design Objectives.

Structures

The structures described below would be required to provide the operational flexibility to divert water to the Mendota Pool, provide fish passage, allow maintenance access to Mendota Dam, prevent fish entrainment and straying, and provide controlled elevation drop between Reach 2B and Reach 3.

Fish Passage Facility on the San Joaquin River Control Structure at the Chowchilla Bifurcation Structure

The existing San Joaquin River control structure at the Chowchilla Bifurcation Structure would not be passable by up-migrating salmon and native fish for all flows and flow splits between the river and the Chowchilla Bypass. The undershot gates, sill across the downstream side of the structure, and trash rack on the upstream side contribute to upstream passage difficulties at high, low, and all flows, respectively. A fish passage facility would be required for upmigrating salmon and other native fish to swim into Reach 2A from Reach 2B under most conditions.

Passage Facility Design

The design of the fish passage facility would be based on criteria in *Anadromous Salmonid Passage Facility Design* (NMFS 2008). The size and geometry of the fish passage facility would be dictated by the flow requirements for juvenile and adult fish (see Table 2-1). Several types of fish passage facility may be considered in detailed

design: vertical slot weir ladder design was included for its ability to accommodate a greater range of water depths (hydraulic head at the upstream and downstream ends), but the design may also consider ice-harbor, pool and chute, rock ramp fishway or other passage facility designs.

Attraction Flows

The attraction flow magnitude will be 5 to 10 percent of the total flow through the control structure over the path of Restoration Flows. The Project requires conveyance of at least 4,500 cfs, so the attraction flow at the passage facility entrance could be as high as 450 cfs. The passage facility itself may have a design flow rate less than the maximum attraction flow. In this case, the balance of attraction flows could be provided at the passage facility entrance (downstream side) through supplementary water, described below.

Supplementary Water

Supplementary water, if incorporated into the facility, is water already in the river and which is piped to the fish passage facility entrance to augment attraction flows (see Figure 2-8). No additional water supply beyond what would be flowing in the river is required. The supplementary water allows the passage facility to operate under a wider range of river flows by supplying additional attraction flow when the need exceeds the design flow rate through the passage facility. Supplementary water would also be used to control the hydraulic head at the passage facility entrance. Supplementary flow would be collected by a water delivery intake structure located upstream from the fish passage facility. The intake structure would include an automated cleaning system, trash rack and a fish screen to prevent migrating fish from entering the intake. River water would enter the intake structure, and travel downriver through pipes to the passage facility entrance.

San Joaquin River Control Structure at the Chowchilla Bifurcation Structure Modifications

In addition to the passage facility, the San Joaquin River control structure at the Chowchilla Bifurcation Structure would be modified to improve fish passage through the control structure itself or to improve operations of the passage facility. Fish passage through the modified river control structure may meet passage criteria only for certain flows, so the fish passage facility described above would still be required.

Improvements to the river control structure could include removing the trash racks, replacing one or more radial gates with over-shot gates (e.g., inflatable Obermeyer weir gates), notching or removal of the baffle wall or weir, removing the dragon's teeth, and replacing or modifying the scour protection. Improvements would be designed based on NMFS 2001 and NMFS 2008 passage criteria. Improvements would not affect the ability of the structure to divert flood water into the Chowchilla Bypass.

San Mateo Avenue Crossing Removal

The San Mateo Avenue crossing is an existing river crossing located within a public right-of-way in Madera County and on private land in Fresno County at approximately RM 211.8. The crossing transitions from public right-of-way to private land at the center of the river. The crossing consists of a low flow or dip crossing with a single culvert. As

part of this alternative, the culvert and road embankments would be demolished, and no river crossing would be provided at this location.

Compact Bypass Bifurcation Structure

A bifurcation structure would be constructed at the upstream end of the Compact Bypass. The bifurcation structure consists of two control structures: one across the path of Restoration Flows (Compact Bypass) and one across the path of water deliveries to Mendota Pool (San Joaquin River). Since this structure will be retaining the Pool, it would likely be regulated by DSOD if owned by a State or local entity.

The control structure across the Compact Bypass would be designed to accommodate up to 4,500 cfs and consists of six 20-foot-wide bays for a structure length of approximately 140 feet. Conditions in this control structure would be designed based on NMFS 2001 and NMFS 2008 fish passage criteria. The control structure across the San Joaquin River (the path of the water deliveries) would be designed to accommodate up to 2,500 cfs and consists of four 20-foot-wide bays for a structure length of approximately 100 feet. Flow through each bay would be controlled by a gate (e.g., radial [Tainter] or inflatable Obermeyer). In the final design, the number and size of the gates may be modified. The size of the gates would be determined by the design maximum flow.

The Compact Bypass control structure includes a fish passage facility on the side of the structure (i.e., the Compact Bypass Fish Passage Facility), and the San Joaquin River (water deliveries flow path) control structure includes a fish screen upstream of the structure (i.e., the Mendota Pool Fish Screen), if appropriate. Each control structure would be placed in the middle of the channel and has earthen embankments connecting the structure to the proposed levees. The connector embankments may include culverts, gates, weirs, inflatable bladder dams, or other features to improve flow and fish passage on the floodplain when water deliveries are not occurring. A 16-foot-wide roadway and 20-foot-wide maintenance/operations platform would be provided over each control structure.

Compact Bypass Fish Passage Facility

The Compact Bypass control structure (across the Restoration Flow path) includes a fish passage facility. The fish passage facility would be necessary to provide passage during water deliveries and for Restoration Flows where passage conditions in the control structure may not be ideal. The design of the fish passage facility is the same as that presented above for the fish passage facility at San Joaquin River control structure at the Chowchilla Bifurcation Structure.

Drive 10 ½ Crossing

The Compact Bypass would cross existing Drive 10 ½, which provides access for the operations and maintenance of Mendota Dam. To continue the current level of access, the road would be rerouted along the bypass channel levees and cross the head of the bypass channel at the proposed Compact Bypass bifurcation structure. A road deck would also be provided over the fish passage facility adjacent to the bifurcation structure. The road would be designed for HS-20 loading (e.g., sufficient to allow transport of a 25-ton maintenance crane to Mendota Dam).

Mendota Pool Fish Screen

A fish screen would be included adjacent to the head of the Compact Bypass where water deliveries would be diverted from the river to Mendota Pool, if appropriate.[7] The fish screen would keep or return out-migrating juvenile salmon to the Compact Bypass (the path of Restoration Flows) during water deliveries. The Compact Bypass Bifurcation Structure is only operated for Exchange Contractor diversions in summer months in highly infrequent dry years or during flood flow deliveries, when flows split several times before entering Mendota Pool and fish survival through the bypasses is high. The Mendota Pool fish screen is the same as described for the South Canal in Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

The screen would be designed to pass flow up to 2,500 cfs. The type of fish screen could be a fixed flat plate in "V" configuration, vertical flat plate, inclined flat plate, cone, or cylindrical screens. Depending on the design type, the fish screen facility may include trash racks, stainless steel wedge wire fish screens, flow control baffle systems behind the screens, screen cleaning systems for the trash racks and screens, bypass flow control weirs, fish-friendly pumps, and/or fish bypass pressure pipelines. The trash racks would be installed at the entrance to the screen structures to protect screens from trash, logs, and other large debris.

Approach, sweeping, and bypass entrance velocities would be kept within established fish screen criteria (NMFS 2008). Flow through the fish screens may be controlled by baffles behind the fish screens. Cleaning of the screens would be accomplished using an automated brush system. Electric power would be needed for fish friendly pumps, if included, and screen cleaning systems. Operation of the fish screens would include methods to reduce predation of juvenile fish (e.g., noise systems to scatter predators, netting, and periodic draining of the screen return pipes).

Grade Control Structures

A series of several (2 to 6), approximately 1.0-foot-high grade-control structures could be included within the bypass channel to achieve the necessary elevation change between Reach 2B and Reach 3, if necessary. The grade control could be provided by constructed rock riffle structures stabilized with sheet piles.

Rock riffles have benefits for native fish migration, but they present construction challenges in the sandy substrate of the Reach 2B and Reach 3 area. The flow over constructed rock riffles may reduce the disorienting effects on juveniles from rapidly changing hydraulics otherwise created at weir structures, and they are more favorable to sturgeon, which do not jump. Constructed rock riffles may be less favorable to predators which can hold in the quiescent pools below weir structures. However, placing rock in sandy substrate requires engineered foundation materials (layers of rock in gradually decreasing sizes) to prevent undermining the structure. Further analysis during design will determine the rock sizes and riffle slopes.

[7] The need for the Mendota Pool fish screen will be further evaluated as Project planning and design continues. This screen is included in Alternative B in the event that it is determined necessary.

Sheet piles would be installed on the upstream side of each rock riffle. Caps on the sheet piles would be used to avoid injuring fish and can be surfaced with natural materials (i.e., grouted rock) to emulate natural conditions which fish may be exposed to in non-manmade portions of the San Joaquin River.

Each grade control structure would extend across the main channel and key into the overbanks to protect against flanking, resulting in a total structure width of about 220 feet.

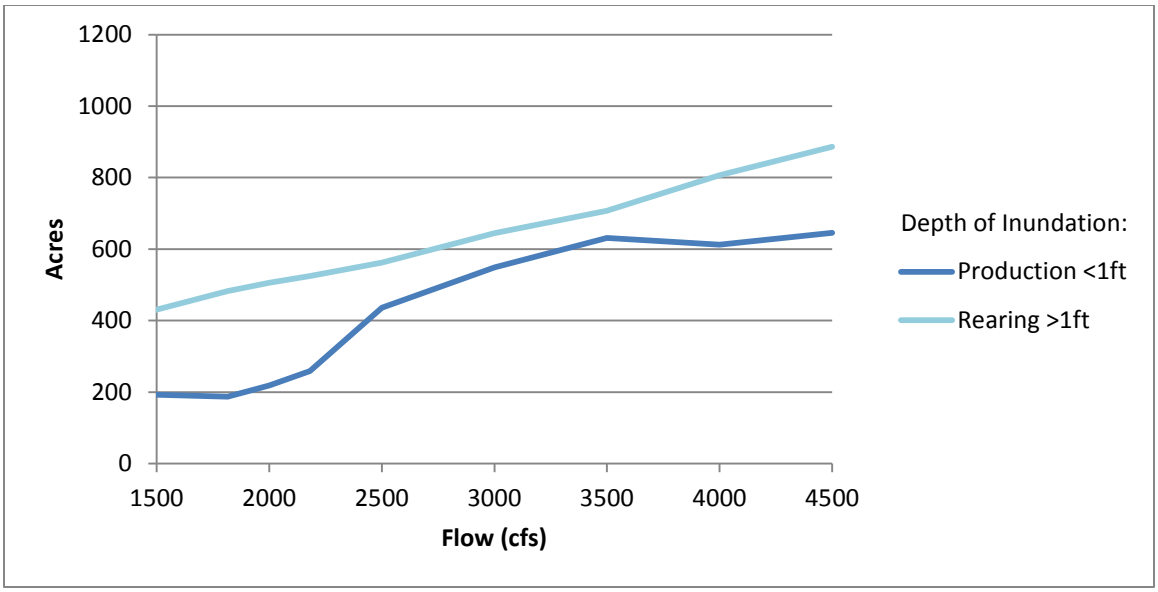
Bank protection measures would be incorporated into the bypass. Bank protection measures could include: vegetated revetment, rock vanes, large woody material structures, bioengineering techniques, and riparian vegetation. Bank protection could be included in the channel, along one channel bank, or along both channel banks. It is assumed that the vegetated revetment would consist of buried riprap covered with topsoil, erosion control fabric, and native woody vegetation, so that fish would experience natural channel banks. Rock vanes would be constructed to only interact with the flow if erosion occurs (i.e., the top of the vane will be level with the constructed overbank surface). Large woody material structures are assumed to be anchored engineered logjams or other similar anchored wood structures that are built into the channel banks. Bioengineering techniques could include vegetated geogrids, fabric encapsulated soil banks, brush mattresses, and root wads. Native woody vegetation directly upstream, downstream, and adjacent to the grade control structures would provide shading and opportunities for juveniles to hide from predators.

Fish Habitat and Passage

The purpose of the floodplain would be to provide riparian and floodplain habitat and support the migration and seasonal rearing of salmonids and other native fishes in Reach 2B. Floodplains would be developed in accordance with the Rearing Habitat Design Objectives. The floodplain has an average width of approximately 4,200 feet and an inundated area of approximately 1,000 acres at 2,500 cfs.

This alternative provides floodplain habitat resulting in approximately 440 acres of shallow water habitat for primary production as well as approximately 560 acres of habitat that supports direct rearing at 2,500 cfs. Approximately 44 percent of the floodplain in this alternative would inundate less than 1 foot deep at 2,500 cfs. This alternative also retains approximately 650 acres of shallow water habitat at flows of 4,500 cfs. Figure 2-12 below presents conceptual inundation areas for primary production and rearing habitats as they vary by flow. Inundation acreages may change during the design process.

In the Compact Bypass channel, floodplain benches with an approximate average width of 150 feet on each side the main flow portion of the bypass channel are included (see section “Compact Bypass Channel.”) Riparian and floodplain habitat would be planted and developed on the benches in the bypass channel to benefit migrating fish and promote a stable channel and sediment transport from Reach 2B to Reach 3.



Source: Reclamation 2015

Figure 2-12.
Potential Inundation Acreage by Flow for Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure)

This alternative includes several facilities that fish may encounter or need to pass to migrate between Reach 3 and Reach 2B (from downstream to upstream):

- Several (2 to 6) in-channel grade control structures in the Compact Bypass.
- Four fish screen return outlets from the Mendota Pool fish screen.
- A bifurcation control structure at the upstream end of the Compact Bypass with fish passage facility.
- The Mendota Pool fish screen adjacent to the upstream end of the Compact Bypass.
- Fish screens at Lone Willow Slough, Big and Little Bertha pumps, and other smaller diversions, if determined necessary (these screens are discussed in Section 2.2.4).
- The San Joaquin River control structure at the Chowchilla Bifurcation Structure with a fish passage facility.

Each structure would be designed to perform according to the fish passage design criteria (see Section 2.2.4). In addition, the channel and floodplain incorporate riparian plantings to provide cover, woody material, and velocity variability, while the design footprint allows sufficient space to incorporate channel structure variability during detailed design, all of which may help to reduce stress and predation.

This alternative does not include a fish barrier at the downstream end of the Compact Bypass to keep fish from migrating upstream of the Compact Bypass in Reach 3 toward the base of Mendota Dam.

Floodplain and Riparian Habitat

This alternative includes a mixture of active and passive riparian and floodplain habitat restoration (in contrast to the passive restoration included in Alternative A) and compatible agricultural activities in the floodplain. Active restoration planting of native riparian species would occur along both banks of the low flow channel of the river up to 450 feet from the bank. In accordance with the Rearing Habitat Design Objectives, it would include native species that would provide shade and reduce air temperatures to help minimize water temperatures, provide large woody debris and organic matter needed to provide habitat and food, and help stabilize the low-flow channel. Some areas may be passively revegetated by creating riparian establishment areas that provide a riparian seed bank of native species. The remaining areas would be seeded with native grasses and forbs to minimize erosion and to help control invasive species. Active revegetation activities would likely include a combination of seeding, transplanting, and pole/live stake plantings. Plantings may be designed as either clusters of trees and shrubs with larger areas of seeded grasses and forbs or as dense forests. Spacing and alignment of plantings would take into account species growth patterns, potential equipment access needs for monitoring and maintenance, and desired future stand development. Passive restoration would occur in areas that rely on Restoration Flows for additional vegetation recruitment. Natural riparian recruitment (passive restoration) would promote continual habitat succession, particularly in areas where sediment is deposited or vegetation is removed by natural processes.

Table 2-3 lists the species that are likely to be planted or seeded during active restoration, and is draft and subject to change. Emergent wetlands and water tolerant woody species of riparian scrub would be selected for development within the main channel, woody shrubs and trees with an herbaceous understory would be selected for development along the main river channel banks, and bands of other habitat types (e.g., grasses) would be selected for development at higher elevations along the channel corridor. Active vegetation restoration would occur following construction and these areas would be irrigated and managed as necessary during the establishment period. Phased implementation of active vegetation restoration at strategic locations could occur concurrently with phased implementation of construction and physical infrastructure.

Agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) could occur on the floodplain in previous agricultural areas outside of State-owned and public trust lands. Growers would be required to leave cover on the ground and would be required to develop and implement a Water Quality Plan, approved by the Reclamation, to meet current water quality standards for aquatic resources and coldwater fisheries, as well as meeting the specific needs for anadromous fishes in adjacent and downstream areas.

Table 2-3.
Potential Species for Revegetation

Common Name	Scientific Name	Vegetation Type
Riparian Shrub and Wetland Areas (0 to 2 feet above summer baseflow elevations)		
Gooding's willow	*Salix gooddingii*	tree
common buttonbrush	*Cephalanthus occidentalis*	shrub
narrowleaf willow	*Salix exigua*	shrub
redroot flatsedge	*Cyperus erythrorhizos*	annual sedge
baltic rush	*Juncus balticus*	perennial rush
dwarf barley	*Hordeum depressum*	annual grass
spike bentgrass	*Agrostis exarata*	perennial grass
meadow barley	*Hordeum brachyantherum*	perennial grass
distant phacelia	*Phacelia distans*	annual forb
seep monkeyflower	*Mimulus guttatus*	annual/perennial forb
yerba mansa	*Anemopsis californica*	perennial forb
Douglas' sagewort	*Artemisia douglasiana*	perennial forb
Dense Riparian Areas (2 to 8 feet above summer baseflow elevations)		
white alder	*Alnus rhombifolia*	tree
Oregon ash	*Fraxinus latifolia*	tree
California sycamore	*Platanus racemosa*	tree
Fremont cottonwood	*Populus fremontii*	tree
Gooding's willow	*Salix gooddingii*	tree
mule-fat	*Baccharis salicifolia*	shrub
California wildrose	*Rosa californica*	shrub
narrowleaf willow	*Salix exigua*	shrub
dwarf barley	*Hordeum depressum*	annual grass
spike bentgrass	*Agrostis exarata*	perennial grass
meadow barley	*Hordeum brachyantherum*	perennial grass
Douglas' sagewort	*Artemisia douglasiana*	perennial forb
Upland Areas (greater than 8 feet above summer baseflow elevations)		
cattle saltbush	*Atriplex polycarpa*	shrub
California wildrose	*Rosa californica*	shrub
Saltgrass	*Distichlis spicata*	perennial grass
blue wildrye	*Elymus glaucus*	perennial grass
beardless wildrye	*Leymus triticodes*	perennial grass
California goldfields	*Lasthenia californica*	annual forb
bull clover	*Trifolium fucatum*	annual forb

Existing Native Vegetation Protection

The existing native vegetation in the Project area designated to remain would be temporarily fenced with orange snow fencing (or equivalent) to prevent entry, driving, parking, or storing equipment or material within these areas during construction. Existing vegetation would be left in place or only minimally trimmed to facilitate access and work at the site. The existing soil is an ideal growing medium for all the desired native plants. In order to maximize plant growth and planting success, existing soil and topsoil would

be preserved unless the soil contains invasive non-native seed or fragmented stems and rhizomes, in which case it should not be preserved, and disturbance during construction would be minimized to the maximum practicable extent.

Invasive Species Control

Invasive, non-native species would be removed from the Project area during the installation, plant establishment and maintenance periods. Invasive species management would consist of removal of the most invasive non-native species within the reach such as giant reed grass (*Arundo donax*), perennial pepperweed (*Lepidium latifolium*) and poison hemlock (*Conium maculatum*). Invasive species management would also include removal of other invasive species that are currently found in upstream reaches and may eventually colonize in the Project area such as red sesbania (*Sesbania punicea*), salt cedar (*Tamarix species*), and Chinese tallow (*Sapium sebiferum*). Invasive plant removal techniques may include mechanical removal, root excavation, hand pulling, mowing, disking, controlled burning, grazing, aquatic-safe herbicides, or a combination of techniques as appropriate.

Temporary Irrigation System and Water Supply

Proposed plantings that are wetland species or borderline wetland species would need regular aboveground irrigation (typically April through October) during their establishment period (typically 3 to 5 years depending on rainfall conditions and the plants' growth rates and vigor). The amount of water needed is estimated to be approximately 2.4 acre feet per year. An extensive temporary aboveground irrigation system, such as aerial spray or drip irrigation, would provide water for the plants several times a week during the hot months of the year. If an aerial spray irrigation system is installed, the irrigation distribution piping would be installed aboveground and anchored to the ground so that it would not be damaged during high flows inundating the floodplain. If an aerial spray system is used, sprinkler heads would likely be installed on braced standpipes so that their irrigation stream would not be blocked or diverted by growing vegetation. The irrigation system would be disassembled and removed at the end of the establishment period.

The Program would pursue options for irrigation water supply, including groundwater wells or water pumped from the river with portable, skid-mounted, diesel- or gas-powered pumps and stored in tanks. Additionally, purchases from willing sellers may be required to withdraw water from the river or other nearby water sources (e.g., Mendota Pool). If water is pumped from the river, the amount of water diverted will be controlled so that river water temperatures do not increase and passage for salmonids is not impaired. The diversion from the river would also be screened if necessary to prevent entraining juvenile salmonids.

Maintenance and Monitoring

Maintenance and monitoring would be conducted following revegetation. Monitoring activities include monitoring of the installed plants for drought stress and overwatering, identification of competitive, invasive, non-native species for removal, identification of diseased, dead and washed-out plants, irrigation system function, and identification of trash and debris for removal. Maintenance activities would include controlling invasive plant species, mitigating animal damage, irrigation, replacement of diseased, dead, or

washed-out plants, irrigation system maintenance, and removal of trash and debris. Management of invasive species would ensure that the desirable vegetation dominates the landscape and provides habitat diversity, productivity, and sustainability. Animal damage to newly planted or germinated vegetation could be alleviated with screens, aquatic-safe chemical deterrents, or other exclusion methods.

Temporary irrigation of wetland and riparian areas during establishment, especially if precipitation is below normal, would facilitate root system development into the alluvium groundwater. Irrigation infrastructure would need to be installed and remain in place for at least 3 years. The irrigation system would be used each year on a biweekly to daily basis during the hot part of the growing season. The landscape contractor would be required to regularly check the integrity of the system and make sure that system is not clogged or damaged. Upland areas would be seeded in the fall before the winter precipitation season, and it is likely that these areas would become established to an acceptable level after one season of normal precipitation. (There may be more than one active revegetation effort required to establish a dense riparian corridor necessary to naturally stabilize the Compact Bypass channel.) Removal of trash and debris from the restoration areas on both sides of the river would be performed on an as-needed basis for the duration of the entire monitoring period.

Long-Term Management

While it is not anticipated that major management actions would be needed, the key objective of management would be to monitor and identify any environmental issues that arise, and use adaptive management to determine what actions would be most appropriate to correct these issues.

The general management approach to the long-term maintenance of the floodplain areas would be to maintain quality habitat for each natural resource, on-going monitoring and maintenance of key environmental characteristics of the entire floodplain area within the reach. An adaptive management approach would be used to incorporate changes to management practices, including corrective actions as determined to be appropriate by Reclamation and/or CSLC. Adaptive management includes those activities necessary to address the effects of climate change, fire, flood, or other natural events, force majeure, etc.

The expected long-term management needs and activities necessary to maintain any on-site mitigation sites would be resource specific long-term maintenance activities and other general maintenance activities such as exotic species elimination, grazing management, clean-up and trash removal, infrastructure management such as gate, fence, road, culvert, signage and drainage-feature repair, and other maintenance activities necessary to maintain the riparian and floodplain habitat quality.

Water Deliveries

This alternative includes a diversion at the head of the Compact Bypass for making up to 2,500 cfs in water deliveries from the San Joaquin River to Mendota Pool. This diversion would directly deliver water from the river to Mendota Pool without the need for a canal. Water deliveries to the Pool would include diversion of Friant Dam releases that are

meant to satisfy the Exchange Contract as well as diversion of San Joaquin River flood flows up to 2,500 cfs if there is demand in Mendota Pool.

When water deliveries occur, the gates at the Compact Bypass bifurcation structure would be manipulated to control flows into the Compact Bypass and allow flows into Mendota Pool. Since the Mendota Pool operating elevation is several feet higher than the bottom of the Compact Bypass channel, operation of the gates would include backwatering a portion of the San Joaquin River upstream of the Compact Bypass bifurcation structure. The extent of the backwater is anticipated to be similar to the extent of the Mendota Pool backwater under existing conditions (i.e., upstream to approximately the existing San Mateo Avenue crossing). Up-migrating fish passage from the Compact Bypass into Reach 2B would occur through the Compact Bypass fish passage facility during water deliveries. The Mendota Pool fish screen would capture out-migrating fish entering the diversion and return them to the Compact Bypass. Sufficient flow to support adult and juvenile fish passage through the Compact Bypass would be maintained during water delivery operations during fish migration periods.

Construction Considerations

The total construction timeline for this alternative is currently estimated to range approximately from 106 to 157 months (9 to 13 years); opportunities to shorten the overall schedule through construction efficiencies will be studied during the detailed design process.

Soil improvements for possible liquefiable soils may be required to protect proposed structures from damage or failure during an earthquake. All proposed structures would be designed to account for potential liquefaction. Soil improvements could include removing and replacing soils with adequate materials, injecting soil-cement slurry, vibrofloatation, dynamic compaction, structural foundation piles (stone or reinforced concrete), and other techniques.[8]

Flow in the San Joaquin River, operations at the existing Mendota Dam, operations at the Chowchilla Bifurcation Structure, and operation of the existing Columbia Canal must be maintained during construction. The majority of the Compact Bypass channel would likely be constructed without interruption to the San Joaquin River flow or the Columbia Canal.

The construction of the Mendota Pool control structure across the existing river channel would require removable cofferdams in three phases to facilitate the construction without blocking the flow. If flow is present in the river during the construction period, flow would be diverted around the work area via a temporary diversion pipe or canal and fish passage would be provided. Cofferdams include two rows of braced sheet piling filled with dirt for stability and seepage control. The total height of the cofferdam is assumed to be 24 feet of which 12 feet would be above the channel bed. The control structures to be

[8] Vibrofloatation uses a vibrating probe that penetrates the soil and causes the grain structure to collapse and increase the density of the soil. Dynamic compaction involves dropping a heavy weight onto soil to compact it.

constructed on dry land (e.g., the Compact Bypass control structure) would not require cofferdams.

Stone slope protection (riprap) would be provided on the upstream and downstream slopes of the control structure embankment including some portions of the side slopes of the channel itself to prevent scouring. Riprap would be placed on bedding over geotextile fabric.

Construction of the fish screen, which is located in the San Joaquin River, would require removable cofferdams in three phases to facilitate the construction without blocking the flow. The exception to this is the return/bypass fish pipes and outlet, which would take place in the dry using conventional construction methods. All fish facility structures and pipes with surfaces exposed to fish require additional attention to surface-smoothness.

For construction of the control structures and fish passage facilities, it would be desirable to maintain a minimum flow during construction; the amount or range of flows during construction has not yet been identified. For construction at the bifurcation, it was assumed that construction would first be done away from the fish passage facility. A sheet pile cofferdam would be provided for the Mendota Pool control structure and/or the Compact Bypass control structure, if needed, and the water diverted away from the construction. Additional sheet piling would be provided to divert flows through the new bifurcation structure while the fish passage facility is constructed.

Demolition of the San Mateo Avenue crossing would be timed so that the lesser Restoration Flows (5 to 195 cfs) can be routed around the structure during demolition.

Summary

Table 2-4 summarizes the levees, relocations, land acquisition, and construction schedule associated with Alterative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure) based on design, field, and evaluation criteria data prepared for the EIS/R.

Table 2-4.
Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure)
Levees, Relocations, and Land Acquisition

	Left Levee	Right Levee
Levee Length	8.1 miles	6.8 miles
Average Levee Height	5.6 feet	4.7 feet
Fill Volume	328,600 cubic yards	226,900 cubic yards

Relocations			
Electrical Distribution	48,500 feet	Barn/Shed	1
Gas Transmission	11,000 feet	Facility	1
Water Pipeline	41,000 feet	Groundwater Well	32
Canal	31,500 feet	Lift Pump	10

Table 2-4.
Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure)
Levees, Relocations, and Land Acquisition

Culvert	1	Power Pole	162
Diversion	3	Dwelling	2
Land Acquisition and Construction Schedule			
Land Acquisition[1]	2,900 acres		
Time to Build[2]	157 months		

[1] Total acreage includes areas that are sovereign and public trust lands.

[2] Construction timeline does not include the time that would also be needed to complete the NEPA and CEQA documentation process, obtain permits, appraise and acquire land, and perform pre-construction surveys.

2.2.7 Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal) includes:

- Building levees capable of conveying flows up to 4,500 cfs with 3 feet of freeboard.
- Restoring floodplain habitat an average of approximately 3,000 feet wide to provide benefit to salmonids and other native fishes.
- Constructing a dam capable of containing Mendota Pool within Fresno Slough so that 4,500 cfs of Restoration Flows can be conveyed around the Mendota Pool.
- Constructing the Short Canal and structures capable of conveying up to 2,500 cfs from Reach 2B to Mendota Pool.
- Providing upstream and downstream fish passage for adult salmonids and other native fishes, and downstream fish passage for juvenile salmonids, between Reach 2A and Reach 3.

This alternative would build a dam across Fresno Slough, the Fresno Slough Dam, to contain the Mendota Pool, and it would utilize the existing river channel in order to bypass the Mendota Pool. Restoration Flows would enter Reach 2B at the Chowchilla Bifurcation Structure, flow through Reach 2B, then downstream to Reach 3 over the sill at Mendota Dam. Mendota Pool would be contained south of the Fresno Slough Dam. The existing Chowchilla Bifurcation Structure would continue to divert San Joaquin River flows into the Chowchilla Bypass during flood operations, and a fish passage facility and control structure modifications would be included at the San Joaquin River control structure at the Chowchilla Bifurcation Structure. A canal to convey San Joaquin River water deliveries to Mendota Pool, the Short Canal, would be built adjacent to the Fresno Slough Dam. The Mendota Dam along with a control structure built at the head of the Short Canal would be used to control diversions into Mendota Pool through the Short Canal. Fish passage facilities at Mendota Dam and a fish screen on the Short Canal would be built to provide passage around Mendota Dam and prevent fish from being entrained

in the diversion. A fish barrier would be built downstream of the Fresno Slough Dam to keep up-migrating fish in Reach 2B. A new crossing would be built at the San Mateo Avenue crossing. These features are described in further detail in the sections below. See Figure 2-13 and Figure 2-14 for a plan view of the alternative's features.

Short Canal

The Short Canal would deliver up to 2,500 cfs in water deliveries from the San Joaquin River to Mendota Pool. The Short Canal could connect to the river either on the east or west side of the Fresno Slough Dam. Additionally, the west-side configuration could be combined with the Main Canal and Helm Ditch Relocations or be constructed independent of those relocations. The Short Canal would discharge into Fresno Slough approximately 0.8 river mile south of Mendota Dam.

Water deliveries would be controlled by a control structure at the north end of the Short Canal and Mendota Dam. The canal control structure would have a fish screen to prevent entrainment and Mendota Dam would be retrofitted with fish passage facilities. The control structures, fish screen, and fish passage facilities are discussed under Structures.

The Short Canal would be concrete-lined with a trapezoidal cross-section. The Short Canal would have a top-width of approximately 70 feet, a total corridor width of approximately 180 feet (including levees and maintenance roads), and 2H to 1V side slopes on the canal banks and 3H to 1V side slopes on the levees. Levee heights would be based on a flow of 2,500 cfs and 3 feet of freeboard.

Structures

The structures described below would be required to provide the operational flexibility to divert water to the Mendota Pool, provide fish passage, prevent fish entrainment and straying, and provide controlled elevation drop between Reach 2B and Reach 3.

Fish Passage Facility on the San Joaquin River Control Structure at the Chowchilla Bifurcation Structure

The fish passage facility is the same as that in Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure) in Section 2.2.6.

San Joaquin River Control Structure at the Chowchilla Bifurcation Structure Modifications

The San Joaquin River control structure at the Chowchilla Bifurcation Structure modifications is the same as described in Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure) in Section 2.2.6.

San Mateo Avenue Crossing Replacement

The existing river crossing at San Mateo Avenue would be replaced with a new culverted crossing. The crossing is the same as described in Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

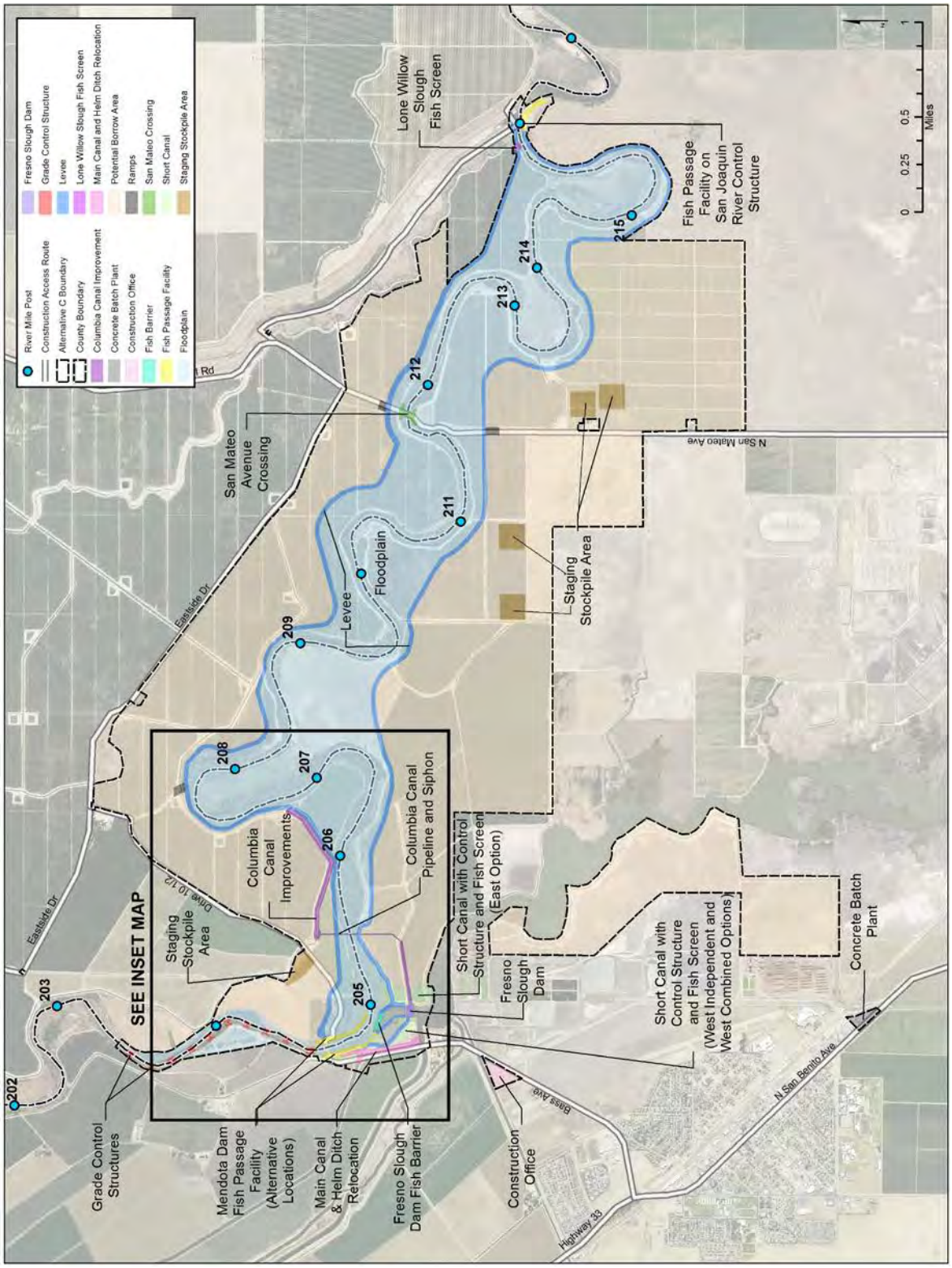


Figure 2-13.
Plan View of Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

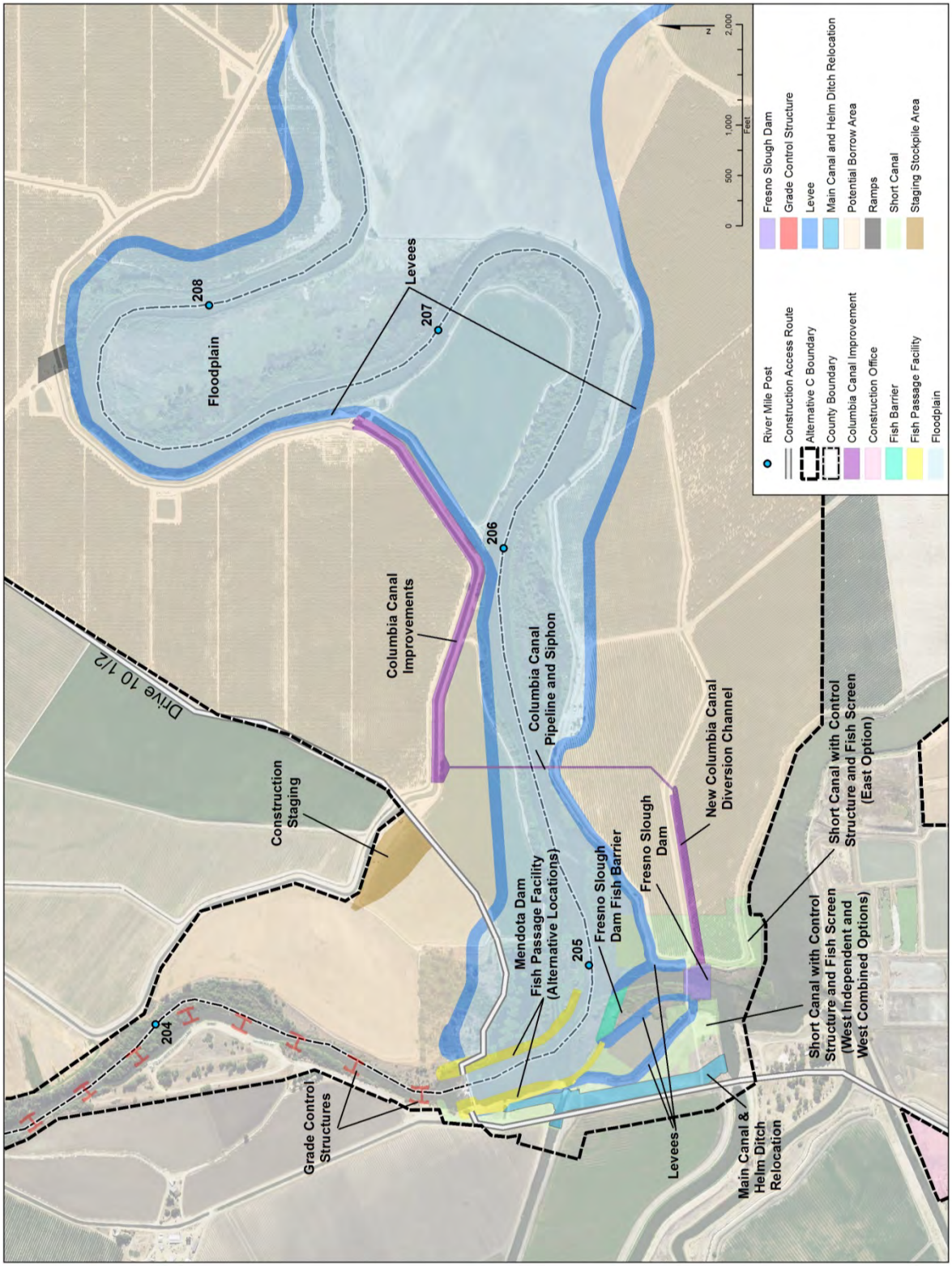


Figure 2-14.
Inset Map of Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Short Canal Control Structure

A control structure would be constructed at the upstream end of the Short Canal. The control structure would be across the path of water deliveries to Mendota Pool. Since this structure will be retaining the Pool, it would likely be regulated by DSOD if owned by a State or local entity. The Short Canal control structure is the same as the control structure across the path of water deliveries described for Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

Short Canal Fish Screen

A fish screen would be included at the head of the Short Canal where water deliveries would be diverted from the river. The fish screen would be necessary to keep or return out-migrating juvenile salmon to the San Joaquin River (the path of Restoration Flows) during water deliveries. The Short Canal fish screen is the same as described for the South Canal in Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

Fresno Slough Dam

The Fresno Slough Dam would be constructed approximately 0.5 mile south of the Mendota Dam, in the existing Fresno Slough. In addition, the dam structure would be located just south of the existing Mowry Bridge that crosses the Fresno Slough. The dam would serve to limit the extent of Mendota Pool so it no longer occupies portions of the San Joaquin River. This pool would feed the five existing irrigation canals (Main Canal, Helm Ditch, Columbia Canal, Outside Canal, and Main Lift Canal). A screened water diversion canal would enable water deliveries from the San Joaquin River to the Mendota Pool. Since inputs into the Mendota Pool would be screened, Fresno Slough Dam does not require provisions for fish passage. Since this structure will be retaining the Pool, it would likely be regulated by DSOD if owned by a State or local entity.

The dam structure would be designed to accommodate a maximum water elevation of 156 feet. This water elevation corresponds to a pool depth of 16 feet above the top of the concrete floor.

The Fresno Slough Dam would have a reinforced concrete spillway. The spillway would likely not require the support of piles. The spillway would include a concrete cutoff wall at the upstream end of the spillway to limit the hydrostatic uplift pressures and reduce the effects of scour. Baffle blocks and riprap would be included at the downstream end of the concrete spillway to limit the effects of scour and erosion.

Directly adjacent to the upstream and downstream ends of the concrete dam structure, a total of four concrete retaining walls form the walls of the spillway, and retain the sides of the earthen embankment portion of the dam. The spillway structure would be comprised of multiple gates, which serve to control the flow of water from the Mendota Pool to the San Joaquin River.

Over the dam, a concrete roadway, concrete maintenance platform, and a hoist operation platform span the full width of the structure. A series of vertical stoplog slots would be included in the concrete abutment walls. The stoplog slots allow the placement of

stoplogs directly upstream of the gates, to facilitate local dewatering of the gates for maintenance operations.

Some excavation of existing channel sediments upstream of the dam will be required to improve flow conditions through the dam during Kings River floods.

Fresno Slough Dam Fish Barrier

A fish exclusion barrier would be included north of the Fresno Slough Dam to prevent adult fish from migrating into Fresno Slough during Kings River flood releases through the Fresno Slough Dam. Levees would be constructed to delineate a channel between the Fresno Slough Dam and the fish barrier, and sediments in the San Joaquin River would be excavated to allow proper structure placement and acceptable sweeping velocities.

The design of the fish barrier is the same as the Reach 3 fish barrier described for Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

Mendota Dam Modifications

This alternative includes using the San Joaquin River channel as a means of bypassing Mendota Pool. Since the Mendota Dam crosses the San Joaquin River, the structure will need to be modified to provide run-of-the-river conditions during Restoration Flows. The concrete portions of structure of Mendota Dam would remain in place, and the flash boards currently used to close the bays and back up water would be removed during non-water delivery operations using the Short Canal. The sill of the dam may be notched in one or more bays to improve fish passage conditions, and the notch would be designed to accommodate flash boards similar to the current bays. When the Short Canal is in operation, the flash boards would be placed in the notch(es) and bays to back up water for water deliveries.

Mendota Dam Fish Passage Facilities

Fish passage facilities are provided at Mendota Dam for two conditions: when the boards are out and when the boards are in. Most of the time, the flash boards at Mendota Dam will be out, and Restoration Flows will pass unimpeded over the sill at Mendota Dam. When water deliveries from the river to Mendota Pool are occurring, the flash boards at Mendota Dam will be installed to create an impoundment. Due to the variation in conditions, different fish passage facilities are required for each condition.

Boards-Out Conditions (no water deliveries occurring)

Passage for boards-out conditions could be accomplished with either grade-control structures, dam notching, a fish passage facility, or a combination of these.

A series of approximately 0.5-foot-high grade control structures could be installed downstream of Mendota Dam to increase the water surface elevation during low flows of around 100 cfs to allow fish passage over the sill when the boards are out at Mendota Dam. The structures would be located several hundred feet apart. Each structure would raise the water surface incrementally on the downstream side of the dam so that

salmonids would be able to migrate over the sill. Other aspects of the grade control structures are the same as those described for those in Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

The sill of the dam could also be notched to provide suitable low flow passage conditions when the boards are out. Notching the dam would involve removing portions of the existing concrete sill and potentially reinforcing the remaining concrete. The notch(es) would be designed to accommodate flash boards so that water delivery operations could occur. Notching could be utilized in combination with the grade control structures to reduce the overall number of structures needed to incrementally raise the water surface on the downstream side of the dam.

Alternatively, a fish passage facility could be installed at Mendota Dam to provide passage when the boards are out. The boards-out fish passage facility could be combined with the boards-in fish passage facility (described below) by including multiple entrances and exits on the facility. Otherwise, an independent fish passage facility for boards-out conditions could be constructed. The design of the boards-out fish passage facility is the same as described for the South Canal fish passage facility in Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

Boards-In Conditions (during water deliveries)

For the Short Canal to operate, the boards at Mendota Dam would be replaced to raise the water surface in the river and back up water into the Mendota Pool. A proposed fish passage facility enables fish to pass over Mendota Dam when the boards are in. The passage facility transitions from the minimum San Joaquin River water surface elevation in Reach 3 (occurring during low flow/base flow conditions) to the normal pool water surface elevation above Mendota Dam. The boards-in fish passage facility could be combined with the boards-out fish passage facility (described above) by including multiple entrances and exits on the facility. Otherwise, an independent fish passage facility for boards-in conditions would be constructed. The design of the boards-in fish passage facility is the same as described for the South Canal fish passage facility in Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

Main Canal and Helm Ditch Relocations

The Fresno Slough Dam requires the headworks of the Central California Irrigation District's (CCID) Main Canal and Helm Ditch to be reconfigured to divert water from the upstream (south) side of the Fresno Slough Dam. This would allow the District to continue to receive their water supply from the Delta-Mendota Canal and flows from the Fresno Slough without requiring screening of those diversions.

To provide water to the CCID's Main Canal and Helm Ditch, an inlet canal is proposed that would take water from the upstream side of the proposed Fresno Slough Dam, run north adjacent to the west side of the San Joaquin River, and connect to the Main Canal and Helm Ditch just west of their current intakes. This canal would be capable of

conveying the full flow of both the Main Canal and the Helm Ditch combined (1,550 cfs).

The inlet canal would be designed to pass the design flow at anticipated low water levels in the Pool, but it would still provide 2 feet of freeboard at the anticipated high water level. The water elevation in the inlet canal would essentially float with the Mendota Pool. A bridge over the inlet canal would be required to maintain access to Mowry Bridge and the future Fresno Slough Dam. Currently, there is a 20-inch drinking water pipeline for the city of Mendota that crosses the Mowry Bridge. This pipeline would need to be modified so that it crosses the proposed inlet canal on the proposed bridge.

The inlet canal would be concrete lined in locations where erosion is likely to be a concern (i.e., at bends and transitions), and riprap would be placed at the transition from the Pool to the inlet channel.

A concrete control structure would control the water from the inlet canal. It would function to control flows to both the Main Canal and the Helm Ditch. Controlling the flow to the Main Canal would be accomplished with control gates. Upstream of the gates on the eastern wall, a pipeline would deliver water to the relocated head of the Helm Ditch. The concrete pipe, equipped with a canal gate, would serve to control the flow rate as well as shutoff point. It is assumed that existing headworks and telemetry for both the Main Canal and Helm Ditch would be removed from the site, and new telemetry would be installed.

The upstream side of the Main Canal structure would have a cutoff wall to prevent undermining the structure. Downstream of the control structure, the Main Canal would transition both vertically and horizontally into the existing Main Canal alignment and cross-section. The extension of Helm Ditch would be designed to match the cross-section of the existing Helm Ditch downstream.

Removal of River Sediments

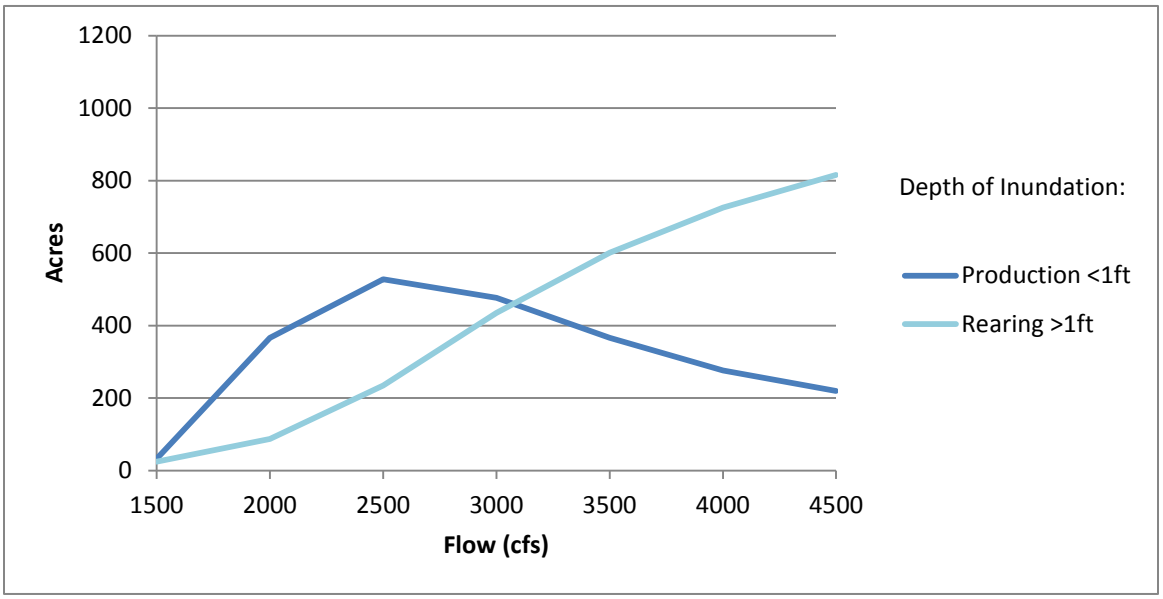
This alternative would make use of the existing river channel from the Chowchilla Bifurcation Structure (approximately RM 216) down to Mendota Dam (approximately RM 204.6) in order to convey Restoration Flows. Since a portion of this river segment is currently impounded by Mendota Dam, sediment has filled in the pre-Mendota Dam channel. This alternative assumes that the sediment would be excavated from portions of the former Pool impoundment area to establish a new equilibrium channel slope. If sediments meet on-site disposal criteria, they may be used to backfill soil borrow areas or to grade low areas on the floodplain.

Fish Habitat and Passage

The purpose of the floodplain would be to provide riparian and floodplain habitat and support the migration and seasonal rearing of salmonids and other native fishes in Reach 2B. The floodplain has an average width of approximately 3,000 feet and an inundated area of approximately 750 acres at 2,500 cfs.

This alternative provides floodplain habitat resulting in approximately 500 acres of shallow water habitat for primary production as well as approximately 250 acres of habitat that supports direct rearing at 2,500 cfs. For this alternative, approximately 65 percent of the floodplain would inundate less than 1 foot deep at 2,500 cfs. This alternative also retains approximately 200 acres of shallow water habitat at flows up to 4,500 cfs.

Figure 2-15 below presents conceptual inundation areas for primary production and rearing habitats as they vary by flow. Inundation acreages may change during the design process.



Source: Tetra Tech 2012

Figure 2-15.
Potential Inundation Acreage by Flow for Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

This alternative includes several facilities that fish may encounter or need to pass to migrate between Reach 3 and Reach 2B (from downstream to upstream):

- An estimated two to four in-channel grade control structures below Mendota Dam.
- The sill of Mendota Dam (when boards are out) or a fish passage facility at Mendota Dam (when boards are in).
- Four fish screen return outlets from the Short Canal fish screen.
- A fish barrier north of the Fresno Slough Dam.
- A fish screen near the upstream end of the Short Canal.
- The San Mateo Avenue crossing.

- Fish screens at Lone Willow Slough, Big and Little Bertha pumps, and other smaller diversions (these screens are discussed in Section 2.2.4).
- A bifurcation control structure at the Chowchilla Bypass with fish passage facility.

Each structure would be designed to perform according to the fish passage design criteria (see Section 2.2.4). In addition, the channel and floodplain incorporate riparian plantings to provide cover, woody material, and velocity variability, while the design footprint allows sufficient space to incorporate channel structure variability during detailed design, all of which may help to reduce stress and predation.

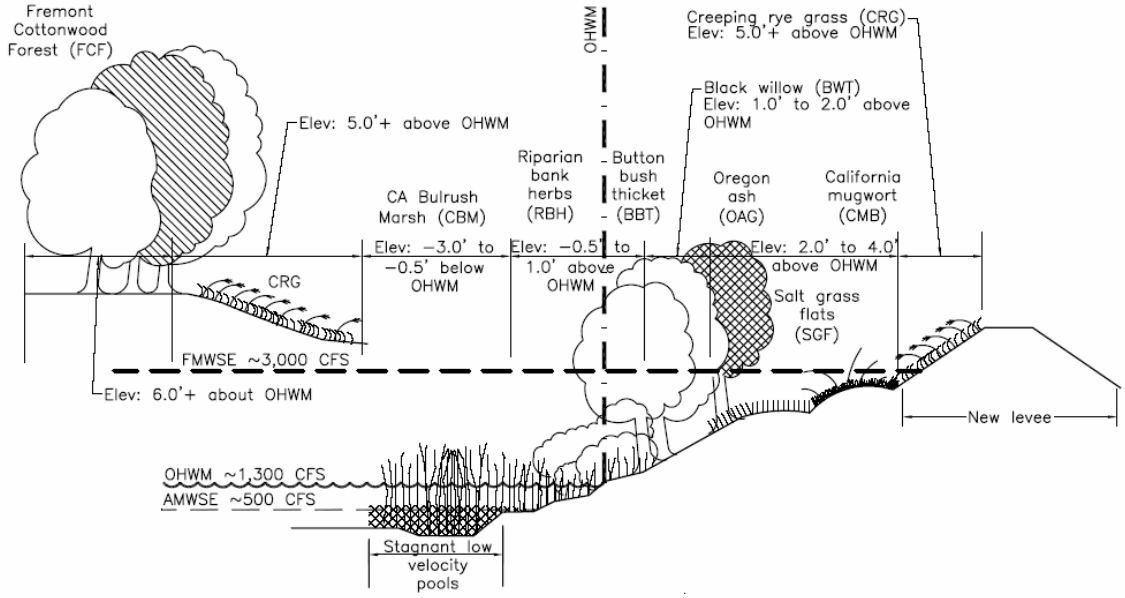
Floodplain and Riparian Habitat

This alternative includes active riparian and floodplain habitat restoration (in contrast to the passive restoration included in Alternative A). It is assumed that wetland communities (obligate, facultative-wet, and facultative species) would develop within the main channel, that a dense riparian scrubland would develop along the main river channel banks, and that bands of other habitat types (wetland, scrub, grassland, and forest) would develop at higher elevations along the channel corridor. The wetland, floodplain, and riparian areas would be planted following construction and then irrigated and managed as necessary during the establishment period. Invasive, non-native species would be removed from the Project area during or following construction, and the Project would include long-term management for invasive species. Phased implementation of active vegetation restoration at strategic locations could occur concurrently with phased implementation of construction and physical infrastructure.

Several native vegetation alliances could be incorporated into the floodplain and habitat planting design (Figure 2-16). The grass-dominated vegetation alliances, which produce the maximum food benefits for salmon, could be more than twice as large as those that would develop with the narrow floodplain alternatives. All of the elevated areas of the meander loops could be maintained or restored to saltgrass flats. The adjacent existing wetland areas within the loops could be preserved or enhanced by additional wetland species plantings and removal of numerous invasive species. The lower lying portions of the reach could be planted with the buttonwillow thicket vegetation alliance. Because of the expanded floodplain and the slowly moving water, the extent of this vegetation alliance could almost quadruple compared to what might develop in the narrow floodplain alternatives.

The extent of black willow thicket and California mugwort brush could also increase over what might develop in the narrow floodplain alternatives. Additional restoration work could focus on the re-establishment of the riparian bank herbs, California bulrush marsh, Oregon ash groves, creeping rye grasslands, and Fremont cottonwood forests. Because of the fast growth and its soft and brittle wood, the cottonwood is considered to be a good source of large woody debris and organic matter within the riverine channel. The riverside levee banks would be planted with native grass species such as those in the creeping rye grassland alliance. Since creeping wild rye (*Leymus triticoides*) is a facultative wetland species that thrives in the upper parts of riparian areas, the extent of

creeping rye grassland could more than double compared to the narrow floodplain alternatives.



Notes: The figure provides an abridged cross-section of the river and floodplain. The upper left-hand portion of the figure shows typical vegetation alliances that would occur on higher ground (above the 3,000 cfs waterline). The left levee would be on the outside, but it is not shown here for brevity purposes. The lower, right-hand portion of the figure shows the range of vegetation alliances that would occur on the levee and on lower ground down to the bottom of the river channel (below the 3,000 cfs waterline).
OHWM – ordinary high water mark; AMWSE = annual mean water surface elevation.

Figure 2-16.
Typical distribution of vegetation alliances along a restored Reach 2B riparian bank section

This alternative would provide potential habitat for greater sandhill crane and Swainson's hawk. The larger floodplains provide increasingly more potential habitat.

Existing Native Vegetation Protection

Existing native vegetation protection would be conducted as described for Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

Invasive Species Control

Invasive, non-native species would be removed from the Project area during the installation, plant establishment and maintenance periods. Maintenance and invasive species control would be conducted as described for Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

Temporary Irrigation System and Water Supply

Proposed plantings that are wetland species or borderline wetland species would need regular aboveground irrigation (typically April through October) during their establishment period (typically 3 to 5 years depending on rainfall conditions and the

plants' growth rates and vigor). The amount of water needed is estimated to be approximately 2.4 acre feet per year. An extensive temporary aboveground irrigation system, such as aerial spray or drip irrigation, would provide water for the plants several times a week during the hot months of the year. If an aerial spray irrigation system is installed, the irrigation distribution piping would be installed aboveground and anchored to the ground so that it would not be damaged during high flows inundating the floodplain. If an aerial spray system is used, sprinkler heads would likely be installed on braced standpipes so that their irrigation stream would not be blocked or diverted by growing vegetation. The irrigation system would be disassembled and removed at the end of the establishment period.

The Program would pursue options for irrigation water supply, including groundwater wells or water pumped from the river with portable, skid-mounted, diesel- or gas-powered pumps and stored in tanks. Additionally, purchases from willing sellers may be required to withdraw water from the river or other nearby water sources (e.g., Mendota Pool). If water is pumped from the river, the amount of water diverted will be controlled so that river water temperatures do not increase and passage for salmonids is not impaired. The diversion from the river would also be screened to prevent entraining juvenile salmonids.

Maintenance and Monitoring

The key maintenance and monitoring activities include close monitoring of the installed plants for drought stress and overwatering, removal of competitive, invasive, non-native species, replacement of diseased and dead plants, irrigation system maintenance, and removal of trash and debris.

Close monitoring of the installed plants for both drought stress and overwatering would be performed because the proposed plants are native wetland species that can be quickly damaged by lack of irrigation.

For irrigation system maintenance, the system would be used intensively each year on a biweekly to daily basis during the hot part of the growing season. The landscape contractor would be required to regularly check the integrity of the system and make sure that none of the sprinkler heads are clogged or damaged.

Long-Term Management

Long-term management would be conducted as described for Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

Water Deliveries

This alternative includes the Short Canal for making up to 2,500 cfs in water deliveries from the San Joaquin River to Mendota Pool. Water deliveries to the Pool would include diversion of Friant Dam releases that are meant to satisfy the Exchange Contract as well as diversion of San Joaquin River flood flows if there is demand in Mendota Pool.

When water deliveries need to occur, the normal pool elevation in Mendota Pool may be higher than the water surface in the river at Fresno Slough Dam. In order for the Short

Canal to be able to deliver water into Mendota Pool, the flash boards of Mendota Dam would be installed, and the water surface in the river would be raised until water could flow from the river south into Mendota Pool via the Short Canal. A fish screen would be included at the Short Canal, and fish passage facilities would be included at Mendota Dam when the boards are in and the diversion is operating.

Construction Considerations

The total construction timeline for this alternative is currently estimated to range approximately from 91 to 133 months (7.5 to 11 years); opportunities to shorten the overall schedule through construction efficiencies will be studied during the detailed design process.

Soil improvements for possible liquefiable soils may be required to protect proposed structures from damage or failure during an earthquake. All proposed structures would be designed to account for potential liquefaction. Soil improvements could include removing and replacing soils with adequate materials, injecting soil-cement slurry, vibrofloatation, dynamic compaction, structural foundation piles (stone or reinforced concrete), and other techniques.[9]

Construction of the Fresno Slough Dam must not interrupt water deliveries. To accomplish this, the construction of the dam would require removable cofferdams in three phases to facilitate the construction without blocking the flow. If flow is present in the slough during the construction period, flow would be diverted around the work area via a temporary diversion pipe or canal and fish passage would be provided.

Stone slope protection (riprap) would be provided on the upstream and downstream slopes of the control structure embankment including some portions of the side slopes of the channel itself to prevent scouring. Riprap would be placed on bedding over geotextile fabric.

Construction of the fish screen and return/bypass fish pipes would take place in the dry using conventional construction methods and must be coordinated with construction of the water delivery canal. The exception to this is the outlet for the fish return pipes, which would require a cofferdam. All fish facility structures and pipes with surfaces exposed to fish require additional attention to surface-smoothness.

For construction of the control structures and fish passage facilities, a minimum flow must be maintained during construction; the amount or range of flows has not yet been identified. For construction at the bifurcation structure, it was assumed that construction would first be done away from the fish passage facility. A sheet pile cofferdam would be provided for the river control structure and/or the canal control structure and the water diverted away from the construction. Additional sheet piling would be provided to divert flows through the new bifurcation structure while the fish passage facility is constructed.

[9] Vibrofloatation uses a vibrating probe that penetrates the soil and causes the grain structure to collapse and increase the density of the soil. Dynamic compaction involves dropping a heavy weight onto soil to compact it.

Summary

Table 2-5 summarizes the levees, relocations, land acquisition, and construction schedule associated with Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal) based on design, field, and evaluation criteria data prepared for the EIS/R.

Table 2-5.
Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)
Levees, Relocations, and Land Acquisition

	Left Levee	Right Levee
Levee Length	7.7 miles	6.9 miles
Average Levee Height	5.6 feet	5.2 feet
Fill Volume	317,500 cubic yards	224,500 cubic yards

Relocations			
Electrical Distribution	48,000 feet	Barn/Shed	1
Gas Transmission	9,000 feet	Facility	1
Water Pipeline	33,000 feet	Groundwater Well	25
Canal	32,500 feet	Lift Pump	10
Culvert	1	Power Pole	166
Diversion	3	Dwelling	2

Land Acquisition and Construction Schedule	
Land Acquisition[1]	2,450 acres
Time to Build[2]	133 months

[1] Total acreage includes areas that are sovereign and public trust lands.

[2] Construction timeline does not include the time that would also be needed to complete the NEPA and CEQA documentation process, obtain permits, appraise and acquire land, and perform pre-construction surveys.

2.2.8 Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal) includes:

- Building levees capable of conveying flows up to 4,500 cfs with 3 feet of freeboard.
- Restoring floodplain habitat an average of approximately 4,200 feet wide to provide benefit to salmonids and other native fishes.
- Constructing a dam capable of containing Mendota Pool within Fresno Slough so that 4,500 cfs of Restoration Flows can be conveyed around the Mendota Pool.
- Constructing the North Canal and structures capable of conveying up to 2,500 cfs from Reach 2B to Mendota Pool.
- Providing upstream and downstream fish passage for adult salmonids and other native fishes, and downstream fish passage for juvenile salmonids, between Reach 2A and Reach 3.

This alternative would build a dam across Fresno Slough, the Fresno Slough Dam, to contain the Mendota Pool, and it would utilize the existing river channel in order to bypass the Mendota Pool. Restoration Flows would enter Reach 2B, flow through the reach, then downstream to Reach 3 over the sill at Mendota Dam. Mendota Pool would be contained south of the Fresno Slough Dam. A canal to convey San Joaquin River water deliveries to Mendota Pool, the North Canal, would be built. The San Joaquin River control structure at the Chowchilla Bifurcation Structure would be removed, and a bifurcation structure would be built at the head of the North Canal to control flood diversions into the Chowchilla Bypass and water delivery diversions into Mendota Pool. Fish passage facilities and a fish screen would be built at the North Canal bifurcation structure to provide passage around the structure and prevent fish being entrained in the diversion. A fish barrier would be built downstream of the Fresno Slough Dam to keep up-migrating fish in Reach 2B. The existing San Mateo Avenue crossing would be removed. These features are described in further detail in the sections below. See Figure 2-17 and Figure 2-18 for a plan view of the alternative's features.

North Canal

The North Canal would deliver up to 2,500 cfs in water deliveries from the San Joaquin River to Mendota Pool. The North Canal could connect to the river at various locations, ideally on a straight section of the river or on the outside of bend. Three optional locations for the junction with the San Joaquin River are shown in Figure 2-17 at approximately RM 209.8, RM 213.4, and RM 214.2. The North Canal would discharge into Fresno Slough approximately 1.8 river miles south of Mendota Dam.

Other aspects of the North Canal are the same as those described for the South Canal in Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

Structures

The structures described below would be required to provide the operational flexibility to divert water to the Mendota Pool, provide fish passage, prevent fish entrainment and straying, and provide controlled elevation drop between Reach 2B and Reach 3.

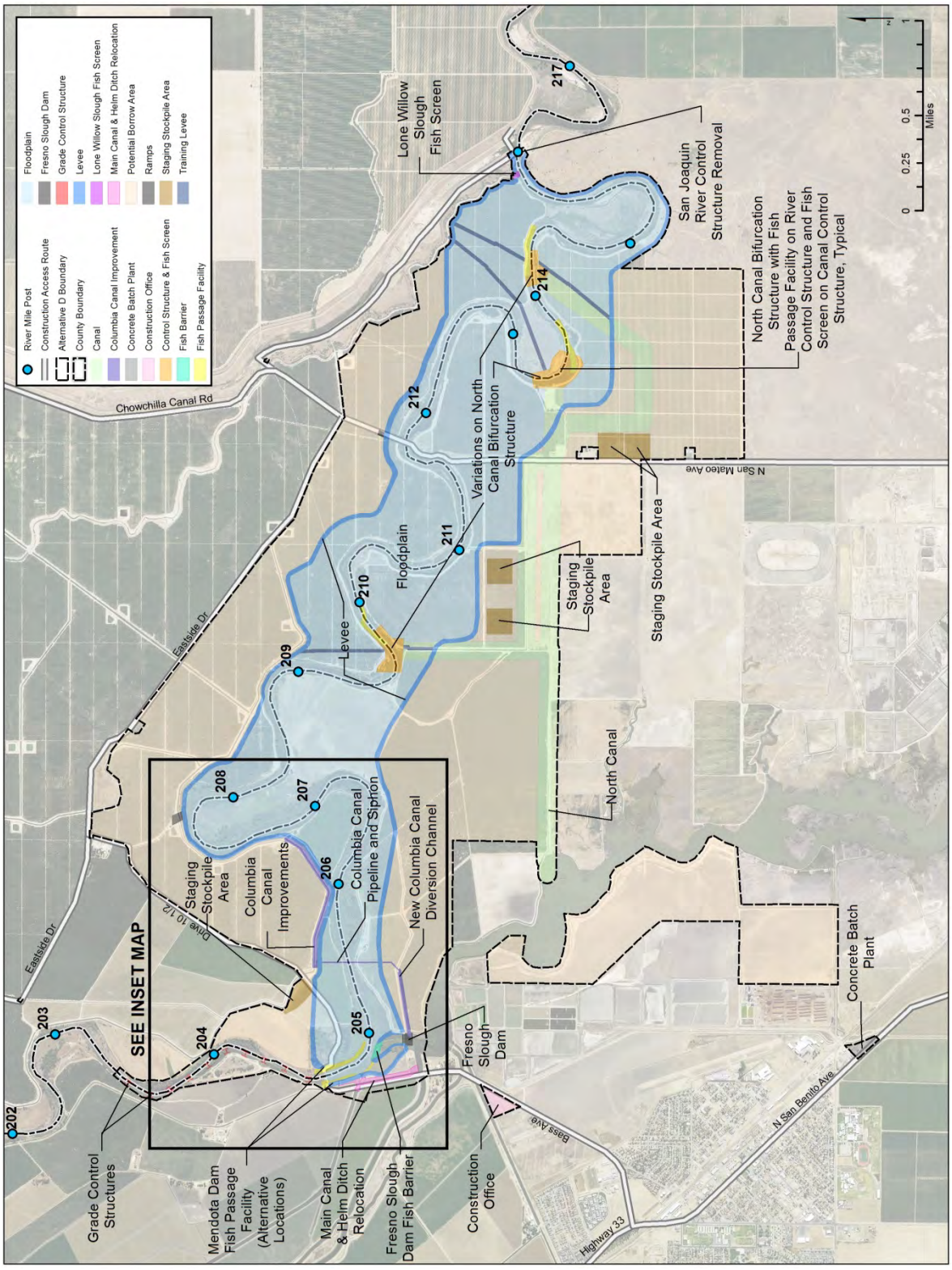


Figure 2-17.
Plan View of Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

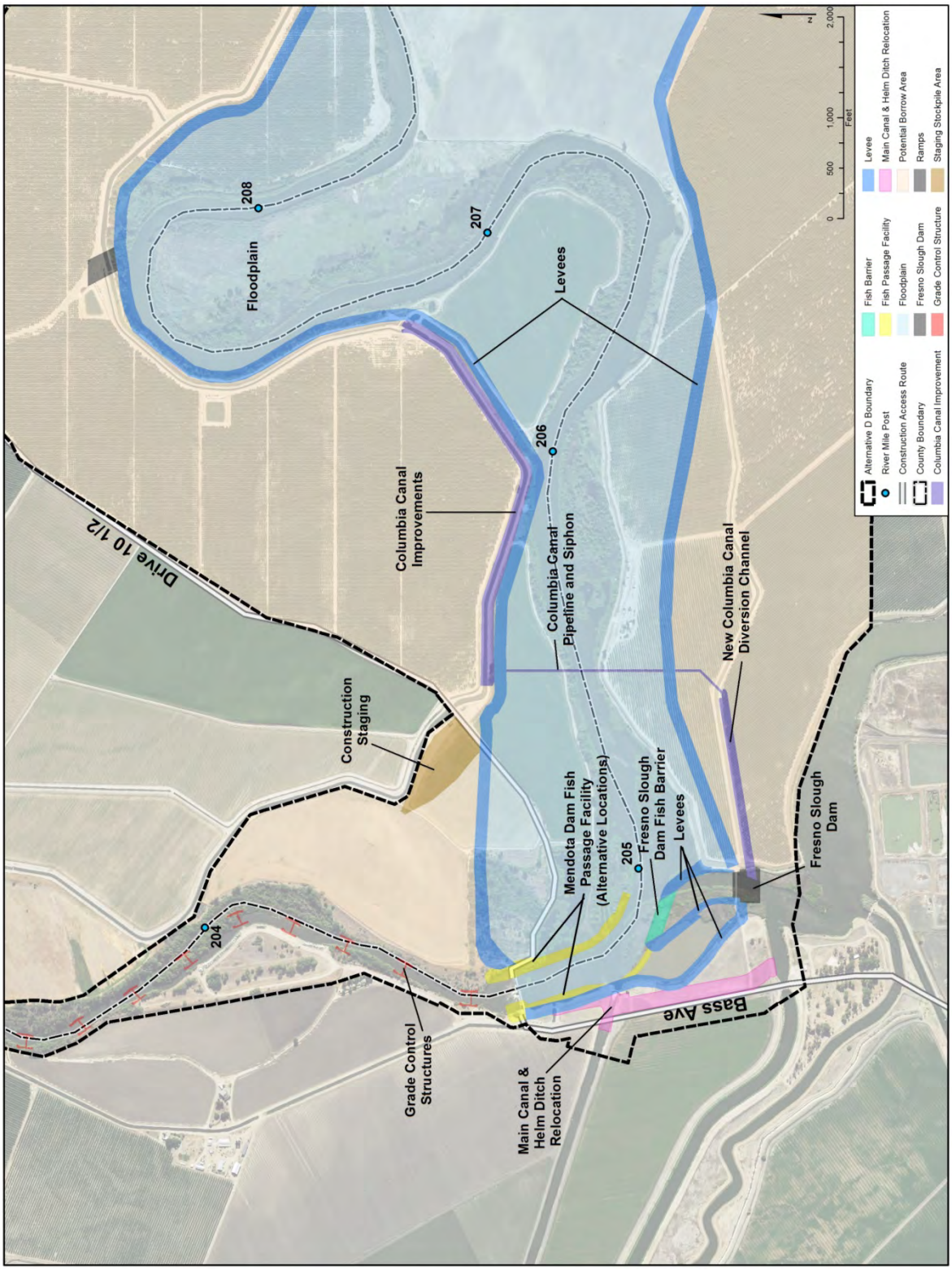


Figure 2-18.
Inset Map of Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

San Joaquin River Control Structure at the Chowchilla Bifurcation Structure Removal

The Chowchilla Bifurcation Structure consists of two control structures: one at the head of the Chowchilla Bypass and one across the San Joaquin River at RM 216. With the inclusion of a bifurcation structure at the head of the North Canal, a new control structure would be built across the San Joaquin River at the head of the canal. The new control structure would alleviate the need for the San Joaquin River control structure at the Chowchilla Bifurcation Structure because all diversions into the Chowchilla Bypass could be controlled from the new control structure at the head of the North Canal. As part of this alternative, the San Joaquin River control structure at the Chowchilla Bifurcation Structure would be demolished.

North Canal Bifurcation Structure

A bifurcation structure would be constructed at the upstream end of the North Canal. The bifurcation structure consists of two control structures: one across the path of Restoration Flows (San Joaquin River) and one across the path of water deliveries to Mendota Pool (North Canal). The North Canal bifurcation structure is the same as described for Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

North Canal Fish Passage Facility

The North Canal bifurcation structure would include a fish passage facility on the side of the control structure across the Restoration Flow path. The fish passage facility would be necessary to provide passage during water deliveries and for Restoration Flows where passage conditions through the control structure may not be ideal. The design of the fish passage facility is the same as that presented for the South Canal fish passage facility in Section 2.2.5.

North Canal Fish Screen

A fish screen would be included at the head of the North Canal where water deliveries would be diverted from the river. The fish screen would be necessary to keep or return out-migrating juvenile salmon to the San Joaquin River (the path of Restoration Flows) during water deliveries. The North Canal fish screen is the same as described for the South Canal in Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5.

San Mateo Avenue Crossing Removal

The San Mateo Avenue crossing is an existing river crossing located within a public right-of-way in Madera County and on private land in Fresno County at approximately RM 211.8. The crossing transitions from public right-of-way to private land at the center of the river. The crossing consists of a low flow or dip crossing with a single culvert. As part of this alternative, the culvert and road embankments would be demolished, and no river crossing would be provided at this location.

Fresno Slough Dam

The Fresno Slough Dam is the same as that described in Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal) in Section 2.2.7.

Fresno Slough Dam Fish Barrier

The Fresno Slough Dam fish barrier is the same as that described in Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal) in Section 2.2.7.

Mendota Dam Fish Passage Facilities

The Mendota Dam fish passage facilities are the same as described for the boards-out condition in Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal) in Section 2.2.7.

Main Canal and Helm Ditch Relocations

The Main Canal and Helm Ditch relocations are the same as described in Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal) in Section 2.2.7.

Removal of River Sediments

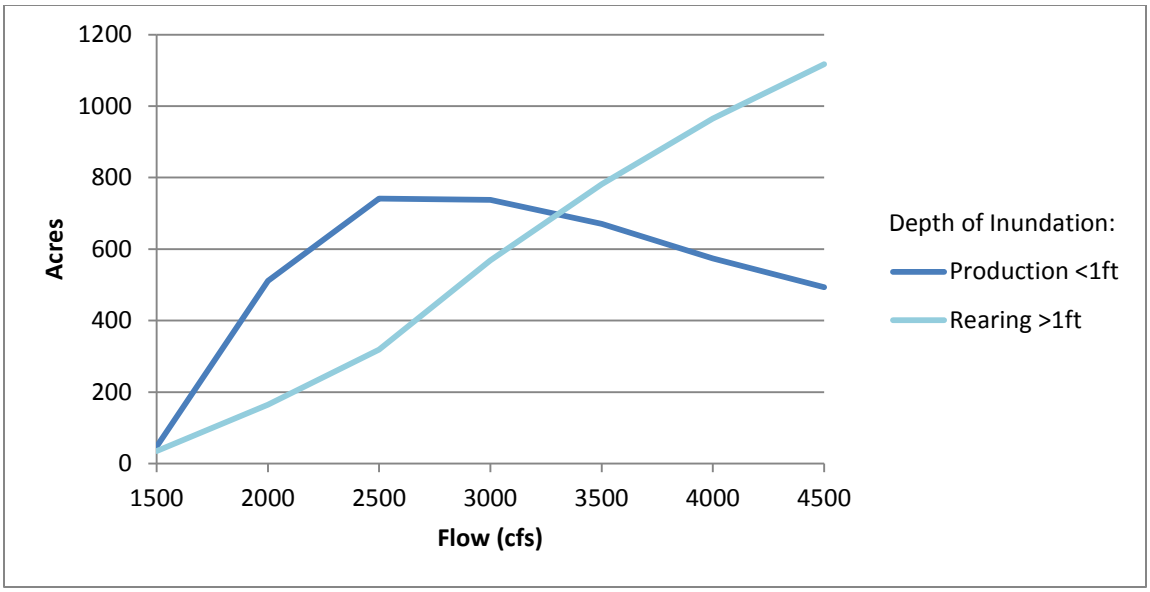
The removal of river sediment is the same as described in Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal) in Section 2.2.7.

Fish Habitat and Passage

The purpose of the floodplain would be to provide riparian and floodplain habitat and support the migration and seasonal rearing of salmonids and other native fishes in Reach 2B. The floodplain has an average width of approximately 4,200 feet and an inundated area of approximately 1,050 acres at 2,500 cfs.

This alternative provides floodplain habitat resulting in approximately 750 acres of shallow water habitat for primary production as well as approximately 300 acres of habitat that supports direct rearing at 2,500 cfs. Approximately 70 percent of the floodplain in this alternative would inundate less than 1 foot deep at 2,500 cfs. This alternative also retains approximately 500 acres of shallow water habitat at flows up to 4,500 cfs.

Figure 2-19 below presents conceptual inundation areas for primary production and rearing habitats as they vary by flow. Inundation acreages may change during the design process.



Source: Tetra Tech 2012

Figure 2-19.
Potential Inundation Acreage by Flow for Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

This alternative includes several facilities that fish may encounter or need to pass to migrate between Reach 3 and Reach 2B (from downstream to upstream):

- An estimated two to four in-channel grade control structures below Mendota Dam.
- The sill of Mendota Dam.
- A fish barrier north of the Fresno Slough Dam.
- Four fish screen return outlets from the North Canal fish screen.
- A bifurcation control structure at the North Canal with fish passage facility.
- A fish screen near the upstream end of the North Canal.
- Fish screens at Lone Willow Slough, Big and Little Bertha pumps, and other smaller diversions (these screens are discussed in Section 2.2.4).

Each structure represents a potential stressor for adult salmon and potential predation site for juvenile salmon. However, each structure would be designed to perform according to the fish passage design criteria (see Section 2.2.4). In addition, the channel and floodplain incorporate riparian plantings to provide cover, woody material, and velocity variability, while the design footprint allows sufficient space to incorporate channel structure variability during detailed design, all of which may help to reduce stress and predation.

Floodplain and Riparian Habitat

Floodplain and riparian habitat restoration actions are similar to those described for Alternative A (Compact Bypass with Narrow Floodplain and South Canal) in Section 2.2.5 would be included in this alternative.

Water Deliveries

This alternative includes the North Canal for making up to 2,500 cfs in water deliveries from the San Joaquin River to Mendota Pool. Water deliveries to the Pool would include diversion of Friant Dam releases that are meant to satisfy the Exchange Contract as well as diversion of San Joaquin River flood flows if there is demand in Mendota Pool.

When water deliveries occur, the gates at the North Canal bifurcation structure would be manipulated to control flows into the downstream river channel and allow flows into the North Canal. To create sufficient hydraulic head to allow water to flow into the canal, operation of the gates would include backwatering a small portion of the San Joaquin River upstream of the North Canal bifurcation structure. The extent of the backwater is anticipated to be small and dependent on the design slope of the canal. Up-migrating fish passage along Reach 2B would occur through the North Canal fish passage facility during water deliveries. The North Canal fish screen would capture out-migrating fish entering the diversion and return them to the river. Some flow in the downstream river channel would be maintained during water delivery operations during fish migration periods.

Construction Considerations

The total construction timeline for this alternative is currently estimated to range approximately from 97 to 158 months (8 to 13 years); opportunities to shorten the overall schedule through construction efficiencies will be studied during the detailed design process. The construction considerations are the same as described for Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal) in Section 2.2.7.

Summary

Table 2-6 summarizes the levees, relocations, land acquisition, and construction schedule associated with Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal) based on design, field, and evaluation criteria data prepared for the EIS/R.

Table 2-6.
Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)
Levees, Relocations, and Land Acquisition

	Left Levee	Right Levee
Levee Length	7.2 miles	6.6 miles
Average Levee Height	5.2 feet	4.2 feet
Fill Volume	272,000 cubic yards	188,250 cubic yards

Relocations			
Electrical Distribution	68,000 feet	Barn/Shed	1
Gas Transmission	11,500 feet	Facility	1
Water Pipeline	50,000 feet	Groundwater Well	32
Canal	56,000 feet	Lift Pump	10
Culvert	1	Power Pole	239
Diversion	3	Dwelling	2

Land Acquisition and Construction Schedule	
Land Acquisition[1]	3,300 acres
Time to Build[2]	158 months

[1] Total acreage includes areas that are sovereign and public trust lands.

[2] Construction timeline does not include the time that would also be needed to complete the NEPA and CEQA documentation process, obtain permits, appraise and acquire land, and perform pre-construction surveys.

2.2.9 Alternatives Comparison Tables

The table below (Table 2-7) combines the summary tables from Sections 2.2.5, 2.2.6, 2.2.7, and 2.2.8 in order to allow easy cross-comparison of the Action Alternatives.

Table 2-7.
Levees, Relocations, and Land Acquisition

	Alternative A	Alternative B	Alternative C	Alternative D
Levees				
Left Levee Length	8.7 miles	8.1 miles	7.7 miles	7.2 miles
Left Average Levee Height	5.8 feet	5.6 feet	5.6 feet	5.2 feet
Left Fill Volume	345,200 cubic yards	328,600 cubic yards	317,500 cubic yards	272,000 cubic yards
Right Levee Length	7.1 miles	6.8 miles	6.9 miles	6.6 miles
Right Average Levee Height	5.4 feet	4.7 feet	5.2 feet	4.2 feet
Right Fill Volume	269,700 cubic yards	226,900 cubic yards	224,500 cubic yards	188,250 cubic yards

Table 2-7.
Levees, Relocations, and Land Acquisition

	Alternative A	Alternative B	Alternative C	Alternative D
Relocations				
Electrical Distribution	43,500 feet	48,500 feet	48,000 feet	68,000 feet
Gas Transmission	10,000 feet	11,000 feet	9,000 feet	11,500 feet
Water Pipeline	31,000 feet	41,000 feet	33,000 feet	50,000 feet
Canal	32,500 feet	31,500 feet	32,500 feet	56,000 feet
Culvert	1	1	1	1
Diversion	3	3	3	3
Barn/Shed	1	1	1	1
Facility	1	1	1	1
Groundwater Well	26	32	25	32
Lift Pump	10	10	10	10
Power Pole	144	162	166	239
Dwelling	2	2	2	2
Land Acquisition and Construction Schedule				
Land Acquisition[1]	2,700 acres	2,900 acres	2,450 acres	3,300 acres
Time to Build[2]	132 months	157 months	133 months	158 months

[1] Total acreage includes areas that are sovereign and public trust lands.

[2] Construction timeline does not include the time that would also be needed to complete the NEPA and CEQA documentation process, obtain permits, appraise and acquire land, and perform pre-construction surveys.

2.2.10 Environmental Commitments

Environmental commitments are measures or practices adopted by a project proponent to reduce or avoid adverse effects that could otherwise result from project construction or operations. The following section describes additional environmental commitments that would be implemented with the Action Alternatives to avoid potentially adverse environmental consequences. These commitments are consistent with those commitments provided in the PEIS/R.

Conservation Strategy

As part of Program implementation, a comprehensive strategy for the conservation of listed and sensitive species and habitats has been prepared, and will be implemented in coordination with USFWS, NMFS, and DFW. The strategy's purpose is to serve as a tool built into the project description to minimize and avoid potential impacts to sensitive species and habitats. This Conservation Strategy guides development and implementation of specific conservation measures for project-level actions. The Conservation Strategy includes conservation goals and measures for species and communities (such as avoidance, minimization, monitoring, and management measures) consistent with adopted recovery plans, as described below. If avoidance and minimization measures are

impractical or infeasible, then adaptive management measures would be pursued and developed in coordination with the appropriate regulatory agency.

To achieve the Restoration Goal, a number of actions that are proposed to be implemented may substantially alter not only the aquatic ecosystem of the San Joaquin River, but also the river's riparian and wetland ecosystems, and some adjacent upland ecosystems. Riparian, wetland, and upland ecosystems of the Central Valley, such as those along the San Joaquin River, provide habitat for a large number of species, including several Federally-listed and State-listed species. Therefore, the Action Alternatives include the Program's Conservation Strategy, which would be implemented in a manner that is consistent with adopted conservation plans for sensitive species, and for wetland and riparian ecosystems of the Restoration Area.

The Conservation Strategy consists of management actions that would result in a net benefit for riparian and wetland habitats in the Project area, to avoid reducing the long-term viability of sensitive species, and to be consistent with adopted conservation plans. The goals of the strategy are described below:

- **Conserve riparian vegetation and waters of the United States, including wetlands** – Project implementation would likely result in a net increase in the acreage of riparian and wetland vegetation in the Project area. However, several Project actions may disturb or eliminate riparian vegetation or waters of the United States (including wetlands). If impacts to waters of the United States (including wetlands), navigable waters, or the Federal levee system cannot be avoided, a Corps Section 404, Section 408, and/or Section 10 permit and Central Valley Regional Water Quality Control Board (RWQCB) Section 401 water quality certification would be obtained. Increased acreage of wetlands resulting from Interim and Restoration flows may be considered a means of replacing, restoring, or enhancing wetlands. However, the acreage, location, and methods of replacing, restoring, or enhancing wetlands would be determined during these permitting processes. The SJRRP has been actively working with resource agencies to further develop the Program's *Riparian Habitat Monitoring, Mitigation, and Management Plan*.
- **Control and manage invasive species** – Because of their adverse effects on aquatic and riparian ecosystems, the spread of invasive plant species as a result of Project would be controlled and managed. For each invasive plant species with known infestations, thresholds for management responses and specific management responses would be established and implemented (including species-specific control methods).
- **Conserve special-status species** – Populations of special-status species would benefit from restoring and sustaining riparian and wetland habitat, and controlling invasive species, as described previously. However, during construction-related activities, a variety of special-status species of upland, wetland, and riparian habitats could experience adverse effects. Therefore, the Conservation Strategy includes measures to prevent or reduce impacts that could result from loss of habitat within the Project footprint or from impacts on adjacent habitat or species.

In addition, this strategy includes coordination with appropriate regulatory agencies to provide mitigation or compensation, consistent with applicable conservation plans, to avoid or minimize effects when actions would result in a net loss of habitat or other substantial adverse effects, if the implementation of avoidance and minimization measures is infeasible or impractical.

These measures address all potentially affected Federally-listed and/or State-listed species, and all other species identified by USFWS, NMFS, or DFW as candidates, sensitive, or special-status in local or regional plans, policies, or regulations. For individual actions under each of the Action Alternatives, the applicable, feasible measures would guide development of action-specific conservation strategies. Table 2-8 presents the elements of the Program's Conservation Strategy as applicable to the Project. The measures presented here are the same as those presented in the PEIS/R (SJRRP 2011a, pages 2-55 to 2-79).

Table 2-8.
Conservation Measures for Biological Resources That May Be Affected by Project Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Regulatory Agency
VELB		
VELB-1. Avoid and Minimize Effects to Species	If elderberry shrubs and valley elderberry longhorn beetle are anticipated within the project area, within 1 year before the commencement of ground-disturbing activities, a qualified biologist shall identify any elderberry shrubs in the project footprint. Qualified biologist(s) will survey potentially affected shrubs for valley elderberry longhorn beetle exit holes in stems greater than 1 inch in diameter. If elderberry shrubs are found on or adjacent to the construction project site, if feasible, a 100-foot-wide avoidance buffer – measured from the dripline of the plant – will be established around elderberry shrubs with stems greater than 1 inch in diameter at ground level and will be clearly identified in the field by staking, flagging, or fencing. No activities will occur within the buffer areas and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.	USFWS
VELB -2. Compensate for Temporary or Permanent Loss of Habitat	The project proponent will consult with USFWS to determine appropriate compensation ratios. Compensatory mitigation measures will be consistent with the *Conservation Guidelines for Valley Elderberry Longhorn Beetle* (USFWS 1999a), or current guidance. Compensatory mitigation for adverse effects may include transplanting elderberry shrubs during the dormant season (November 1 to February 15), if feasible, to an area protected in perpetuity, as well as required additional elderberry and associated native plantings and approved by USFWS. If off-site compensation includes dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the	USFWS

Table 2-8.
Conservation Measures for Biological Resources That May Be Affected by Project Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Regulatory Agency
	preservation of long-term viable populations.	
BNLL	**Blunt-Nosed Leopard Lizard**	
BNLL-1. Avoid and Minimize Effects to Species	Three areas have been identified as having potential blunt-nosed leopard lizard habitat based on aerial maps. These areas include approximately 2,460 acres along the southwest side of the San Joaquin River in Reach 2, approximately 490 acres in a portion of the Eastside Bypass and adjacent lands near Reach 4A of the San Joaquin River, and approximately 2,938 acres encompassing the northern side of the Mariposa Bypass and parcels north of the Mariposa Bypass and west of the Eastside Bypass. Within 1 year before the commencement of the proposed project, focused site visits and habitat assessment will be conducted on these lands. Based on focused assessment, and discussions with the USFWS and DFW, protocol-level surveys may be conducted. If blunt-nosed leopard lizard are detected within or adjacent to the project site, measures that will avoid direct take of this species will be developed in cooperation with USFWS and DFW and implemented before ground disturbing activities.	USFWS DFW
BNLL-2. Compensate for Temporary or Permanent Loss of Habitat or Species	Compensation for impacts to the species, if needed, will be determined in coordination with USFWS and DFW, as appropriate.	USFWS DFW
PLANTS	**Other Special-Status Plants**	
PLANTS-1. Avoid and Minimize Effects to Special-Status Plants	Within 1 year before the commencement of ground-disturbing activities, habitat assessment surveys for the special-status plants listed in Table 1 of Appendix L of the PEIS/R, "Biological Resources – Vegetation and Wildlife," that are applicable to Reach 2B will be conducted by a qualified botanist, in accordance with the most recent USFWS and DFW guidelines and at the appropriate time of year when the target species would be in flower or otherwise clearly identifiable. Locations of special-status plant populations will be clearly identified in the field by staking, flagging, or fencing a minimum 100-foot-wide buffer around them before the commencement of activities that may cause disturbance. No activity shall occur within the buffer area, and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented. Some special-status plant species are annual plants, meaning that a plant completes its entire life cycle in one growing season. Other special-status plant species are perennial plants that return year after year until they reach full maturity. Because of the differences in plant life histories, all general conservation measures will be developed on a case-by-case basis and will include strategies that are species- and site-specific to avoid impacts to special-status plants.	USFWS DFW
GGS	**Giant Garter Snake**	
GGS-1. Avoid and Minimize Loss of Habitat	If giant garter snake habitat is anticipated to be present within the project area, preconstruction surveys will be completed by a qualified biologist approved by USFWS and DFW within a 24-hour period before	Reclamation USFWS DFW

Table 2-8.
Conservation Measures for Biological Resources That May Be Affected by Project Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Regulatory Agency
for Giant Garter Snake	any ground disturbance of potential giant garter snake habitat. If construction activities stop on the project site for a period of 2 weeks or more, a new giant garter snake survey will be completed no more than 24 hours before the restart of construction activities. Avoidance of suitable giant garter snake habitat, as defined by USFWS (USFWS 1993) and DFW, will occur by demarcating and maintaining a 300-foot-wide buffer around these areas. For projects within potential giant garter snake habitat, all activity involving disturbance of potential giant garter snake habitat will be restricted to the period between May 1 and October 1, the active season for giant garter snakes. The construction site shall be re-inspected if a lapse in construction activity of 2 weeks or greater has occurred. Clearing will be confined to the minimal area necessary to facilitate construction activities. Giant garter snake habitat within or adjacent to the project will be flagged, staked, or fenced and designated as an Environmentally Sensitive Area. No activity shall occur within this area, and USFWS-approved worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented. Construction activities shall be minimized within 200 feet of the banks of giant garter snake habitat. Movement of heavy equipment will be confined to existing roadways to minimize habitat disturbance. Vegetation shall be hand-cleared in areas where giant garter snakes are suspected to occur. Exclusionary fencing with one-way exit funnels shall be installed at least 1 month before activities to allow the species to passively leave the area and to prevent reentry into work zones, per USFWS and/or DFW guidance. If a giant garter snake is found during construction activities, USFWS, DFW, and the project's biological monitor will immediately be notified. The biological monitor, or his/her assignee, will stop construction in the vicinity of the find and allow the snake to leave on its own. The monitor will remain in the area for the remainder of the work day to ensure the snake is not harmed. Escape routes for giant garter snake should be determined in advance of construction and snakes will be allowed to leave on their own. If a giant garter snake does not leave on its own within 1 working day, USFWS and DFW will be consulted. All construction-related holes shall be covered to prevent entrapment of individuals. Where applicable, construction areas shall be dewatered 2 weeks before the start of activities to allow giant garter snakes and their prey to move out of the area before any disturbance.	
GGS-2. Compensate for Temporary or Permanent Loss of Habitat	Temporarily affected giant garter snake aquatic habitat will be restored in accordance with criteria listed in the USFWS Mitigation Criteria for Restoration and/or Replacement of Giant Garter Snake Habitat (Appendix A to *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake Within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, and Yolo Counties, California* (USFWS 1997)), or the most current criteria from USFWS or DFW. Permanent loss of giant garter snake habitat will be compensated at a	USFWS DFW

Table 2-8.
Conservation Measures for Biological Resources That May Be Affected by Project Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Regulatory Agency
	ratio and in a manner consulted on with USFWS and DFW. Compensation may include preservation and enhancement of existing populations, restoration or creation of suitable habitat, or purchase of credits at a regulatory-agency-approved mitigation bank in sufficient quantity to compensate for the effect. Credit purchases, land preservation, or land enhancement to minimize effects to giant garter snakes should occur geographically close to the impact area. If off-site compensation is chosen, it shall include dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, and the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.	
WPT	**Western Pond Turtle**	
WPT-1. Avoid and Minimize Loss of Individuals	A qualified biologist will conduct surveys in aquatic habitats to be dewatered and/or filled during project construction. Surveys will be conducted immediately after dewatering and before fill of aquatic habitat suitable for western pond turtles. If western pond turtles are found, the biologist will capture them and move them to nearby USFWS- and/or DFW-approved areas of suitable habitat that will not be disturbed by project construction.	DFW
EAGLE	**Bald Eagle and Golden Eagle**	
EAGLE-1. Avoid and Minimize Effects to Bald and Golden Eagles (as Defined in the Bald and Golden Eagle Protection Act)	Surveys for bald and golden eagle nests will be conducted within 2 miles of any proposed project within areas supporting suitable nesting habitat and important eagle roost sites and foraging areas. These surveys will be conducted in accordance with the USFWS *Protocol for Evaluating Bald Eagle Habitat and Populations in California* and DFW *Bald Eagle Breeding Survey Instructions* or current guidance (*USFWS Draft Project Design Criteria and Guidance for Bald and Golden Eagles*). If an active eagle's nest is found, project disturbance will not occur within ½-mile of the active nest site during the breeding season (typically December 30 to July 1) or any project disturbance if it is shown to disturb the nesting birds. A no-disturbance buffer will be established around the nest site for construction activities in consultation with USFWS and DFW, and will depend on ecological factors, including topography, surrounding vegetation, nest height, and distance to foraging habitat, as well as the type and magnitude of disturbance. Project activity will not occur within the ½-mile-buffer areas, and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.	USFWS DFW
SWH	**Swainson's Hawk**	
SWH-1. Avoid and Minimize Impacts to Swainson's	Preconstruction surveys for active Swainson's hawk nests will be conducted in and around all potential nest trees within ½-mile of project-related disturbance (including construction-related traffic). These surveys will be conducted in accordance with *the Recommended*	DFW

Table 2-8.
Conservation Measures for Biological Resources That May Be Affected by Project Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Regulatory Agency
Hawk	*Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee 2000) or current guidance. If known or active nests are identified through preconstruction surveys or other means, a ½-mile no-disturbance buffer shall be established around all active nest sites if construction cannot be limited to occur outside the nesting season (February 15 through September 15). Worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.	
SWH-2. Compensate for Loss of Nest Trees and Foraging Habitat	If foraging habitat for Swainson's hawk is removed in association with project implementation, foraging habitat compensation will occur in coordination with DFW. Foraging habitat mitigation may consist of planting and establishing alfalfa, row crops, pasture, or fallow fields. If potential nesting trees are to be removed during construction activities, removal will take place outside of Swainson's hawk nesting season, and the project proponent will develop a plan to replace known Swainson's hawk nest trees with a number of equivalent native trees that were previously determined to be impacts through consultation with DFW. Compensation shall include dedication of conservation easements, purchase of mitigation credits, or other off-site conservation measures, and the details of these measures will be included in the mitigation plan and must occur with full endowments for management in perpetuity. The plan will include information on responsible parties for long-term management, holders of conservations easements, long-term management requirements, and other details, as appropriate, for the preservation of long-term viable populations.	DFW
RAPTOR	**Other Nesting Raptors**	
RAPTOR-1. Avoid and Minimize Loss of Individual Raptors	Construction activity, including vegetation removal, will only occur outside the typical breeding season for raptors (September 16 to December 31), if raptors are determined to be present. Preconstruction surveys will be conducted by a qualified biologist in areas of suitable habitat to identify active nests in the project footprint. If active nests are located in the project footprint, a no-disturbance buffer will be established until a qualified biologist determines that the nest is no longer active. The size of the buffer shall be established by a qualified biologist in coordination with DFW based on the sensitivity of the resource, the type of disturbance activity, and nesting stage. No activity shall occur within the buffer area, and worker awareness training and biological monitoring will be conducted to ensure that avoidance measures are being implemented.	DFW
RAPTOR-2. Compensate for Loss of Nest Trees	Native trees removed during project activities will be replaced with an appropriate number of native trees, in coordination with DFW.	DFW
RNB	**Riparian Nesting Birds: Least Bell's Vireo**	
RNB-1. Avoid Effects to Species	If least Bell's vireo is anticipated within a project area, a qualified biologist shall make an initial site visit to determine if suitable habitat for the species may exist within the project footprint. Where suitable habitat may be present, reconnaissance-level surveys	USFWS DFW

Table 2-8.
Conservation Measures for Biological Resources That May Be Affected by Project Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Regulatory Agency
	would be conducted by biologists adhering to guidance offered in *Least Bell's Vireo Survey Guidelines*, USFWS, January 19, 2001.	
RNB-2. Avoid, Minimize, and Compensate for Effects to Species	If least Bell's vireo is detected or suspected to be present in the project footprint, information would be collected according to the guidelines stated in RNB-1. USFWS and DFW would be contacted to determine the approach for avoidance, minimization, or compensation.	USFWS DFW
MBTA	**Other Birds Protected by the Migratory Bird Treaty Act**	
MBTA-1. Avoid and Minimize Effects to Species	Native nesting birds will be avoided by not conducting project activity, including vegetation removal, during the typical breeding season (February 1 to September 1), if species covered under the Migratory Bird Treaty Act and Fish and Game Code sections 3503, 3503.5, and 3513 are determined to be present. An Avian Protection Plan shall be established in coordination with USFWS and DFW. Any overhead utility companies within the project area, whose lines, poles, or towers may be moved in association with the project, will also be consulted as part of the Avian Protection Plan.	USFWS DFW
BRO	**Burrowing Owl**	
BRO-1. Avoid Loss of Species	Preconstruction surveys for burrowing owls will be conducted in areas supporting potentially suitable habitat and within 30 days before the start of construction activities. If ground-disturbing activities are delayed or suspended for more than 30 days after the preconstruction survey, the site should be resurveyed. These surveys and mitigation will be conducted in accordance with the *Burrowing Owl Survey Protocol and Mitigation Guidelines* (The California Burrowing Owl Consortium 1993), or current guidance. Occupied burrows shall not be disturbed during the breeding season (February 1 through August 31). A minimum 160-foot-wide buffer shall be placed around occupied burrows during the nonbreeding season (September 1 through January 31), and a 250-foot-wide buffer shall be placed around occupied burrows during the breeding season. Ground-disturbing activities shall not occur within the designated buffers.	DFW
BRO-2. Minimize Impacts to Species	If a DFW-approved biologist can verify through noninvasive methods that owls have not begun egg-laying and incubation, or that juveniles from occupied burrows are foraging independently and are capable of independent survival, a plan shall be coordinated with DFW to offset burrow habitat and foraging areas on the project site if burrows and foraging areas are taken by SJRRP actions. Mitigation measures will be consistent with the *Staff Report on Burrowing Owl Mitigation* (DFW 2012), or current guidance. If destruction of occupied burrows occurs, existing unsuitable burrows should be enhanced (enlarged or cleared of debris) or new burrows created. This should be done in consultation with DFW. Passive owl relocation techniques must be implemented. Owls should be excluded from burrows in the immediate impact zone within a 160-foot-wide buffer zone by installing one-way doors in burrow entrances. These doors shall be in place at least 48 hours before excavation to insure the owls have departed. The project area shall be monitored daily for 1 week to confirm owl	DFW

Table 2-8.
Conservation Measures for Biological Resources That May Be Affected by Project Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Regulatory Agency
	departure from burrows before any ground-disturbing activities. Where possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe should be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow.	
BAT	**Special-Status Bats**	
BAT-1. Avoid and Minimize Loss of Species	If suitable roosting habitat for special-status bats will be affected by project construction (e.g., removal of buildings, modification of bridges), surveys for roosting bats on the project site will be conducted by a qualified biologist. The type of survey will depend on the condition of the potential roosting habitat and may include visual surveys or use of acoustic detectors. Visual surveys may consist of a daytime pedestrian survey for evidence of bat use (e.g., guano) and/or an evening emergence survey for the presence or absence of bats and will include trees within ¼-mile of project construction activities. The type of survey will depend on the condition of the potential roosting habitat. If no bat roosts are found, then no further study is required. If evidence of bat use is observed, the number and species of bats using the roost will be determined. Bat detectors may be used to supplement survey efforts. If roosts are determined to be present and must be removed, the bats will be excluded from the roosting site before the facility is removed. A mitigation program addressing compensation, exclusion methods, and roost removal procedures will be developed in consultation with DFW before implementation. Exclusion methods may include use of one-way doors at roost entrances (bats may leave, but not reenter), or sealing roost entrances when a site can be confirmed to contain no bats. Exclusion efforts may be restricted during periods of sensitive activity (e.g., during hibernation or while females in maternity colonies are nursing young).	DFW
BAT-2. Compensate for Loss of Habitat	The loss of each roost will be replaced, in consultation with DFW, and may include construction and installation of bat boxes suitable to the bat species and colony size excluded from the original roosting site. Roost replacement will be implemented before bats are excluded from the original roost sites. Once the replacement roosts are constructed and it is confirmed that bats are not present in the original roost sites, the structure may be removed.	DFW
FKR	**Fresno Kangaroo Rat**	
FKR-1. Avoid and Minimize Effects to Species	Preconstruction surveys will be conducted by a qualified biologist per USFWS and DFW survey methodology to determine if potential burrows for Fresno kangaroo rat are present in the project footprint. Surveys will be conducted within 30 days before ground-disturbing activities. The biologist will conduct burrow searches by systematically walking transects, which shall be adjusted based on vegetation height and topography, and in coordination with USFWS and DFW. Transects shall be used to identify the presence of kangaroo rat burrows. When burrows are found within 100 feet of the Project footprint, focused live trapping surveys shall be conducted by a qualified and permitted biologist, following a methodology approved in advance by USFWS and	USFWS DFW

Table 2-8.
Conservation Measures for Biological Resources That May Be Affected by Project Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Regulatory Agency
	DFW. Additional conservation measures may be developed pending the results of surveys, and in consultation with USFWS and DFW. Construction activities shall be conducted when they are least likely to affect the species (i.e., after the normal breeding season of December through September (Ahlborn 1999)). This timing shall be coordinated with USFWS and DFW.	
FKR-3. Compensate for Temporary or Permanent Loss of Habitat or Species	Compensation for impacts to the species, if needed, will be determined in coordination with DFW and USFWS, as appropriate.	USFWS DFW
SJKF	**San Joaquin Kit Fox**	
SJKF-1. Avoid and Minimize Effects to Species	A qualified biologist will conduct preconstruction surveys no less than 14 days and no more than 30 days before the commencement of activities to identify potential dens more than 5 inches in diameter. The project proponent shall implement USFWS' (1999b) *Standardized Recommendations for Protection of San Joaquin Kit Fox Prior to or During Ground Disturbance.* The project proponent will notify USFWS and DFW in writing of the results of the preconstruction survey within 30 days after these activities are completed. If dens are located within the proposed work area, and cannot be avoided during construction activities, a USFWS-approved biologist will determine if the dens are occupied. If occupied dens are present within the proposed work, their disturbance and destruction shall be avoided. Exclusion zones will be implemented following the latest USFWS procedures (currently USFWS 1999b). The project proponent will notify USFWS and DFW immediately if a natal or pupping den is found in the survey area. The project proponent will present the results of preactivity den searches within 5 days after these activities are completed and before the start of construction activities in the area. Construction activities shall be conducted when they are least likely to affect the species (i.e., after the normal breeding season of December–April (Ahlborn 2000)). This timing shall be coordinated with USFWS and DFW.	USFWS DFW
PL	**Pacific Lamprey**	
PL-1. Avoid and Minimize Effects to Species	A qualified biologist will conduct preconstruction surveys as outlined in Attachment A of USFWS' *Best Management Practices to Minimize Adverse Effects to Pacific Lamprey* (*Entosphenus tridentatus*) (2010). Work in documented areas of Pacific lamprey presence will be timed to avoid in-channel work during typical lamprey spawning (March 1 to July 1). If temporary dewatering in documented areas of lamprey presence is required for instream channel work, salvage methods shall be	USFWS

Table 2-8.
Conservation Measures for Biological Resources That May Be Affected by Project Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Regulatory Agency
	implemented to capture and move ammocoetes to a safe area, in consultation with USFWS.	
RHSNC	**Riparian Habitat and Other Sensitive Natural Communities**	
RHSNC-1. Avoid and Minimize Loss of Riparian Habitat and Other Sensitive Natural Communities	Biological surveys will be conducted to identify, map, and quantify riparian and other sensitive habitats in potential construction areas. Construction activities will be avoided in areas containing sensitive natural communities, as appropriate.	DFW
RHSNC-2. Compensate for Loss of Riparian Habitat and Other Sensitive Natural Communities	The Riparian Habitat Mitigation and Monitoring Plan for the SJRRP will be developed and implemented in coordination with DFW. Credits for increased acreage or improved ecological function or riparian and wetland habitats resulting from the implementation of SJRRP actions will be applied as compensatory mitigation before additional compensatory measures are required. If losses of other sensitive natural communities (e.g., recognized as sensitive by CNDDB, but not protected under other regulations or policies) would not be offset by the benefits of the SJRRP, then additional compensation will be provided through creating, restoring, or preserving in perpetuity in-kind communities at a sufficient ratio for no net loss of habitat function or acreage. The appropriate ratio will be determined in consultation with USFWS or DFW, depending on agency jurisdiction.	DFW
WUS	**Waters of the United States/Waters of the State**	
WUS-1. Identify and Quantify Wetlands and Other Waters of the United States	Before SJRRP actions that may affect waters of the United States or waters of the State, Reclamation will map the distribution of wetlands (including vernal pools and other seasonal wetlands) in the Eastside and Mariposa bypasses. The project proponent will determine, based on the mapped distribution of these wetlands and hydraulic modeling and field observation, the acreage of effects, if any, on waters of the United States. If it is determined that vernal pools or other seasonal wetlands will be affected by the SJRRP, the project proponent will conduct a delineation of waters of the United States, and submit the delineation to the Corps for verification. The delineation will be conducted according to methods established in the Corps *Wetlands Delineation Manual* and *Arid West Supplement* (Corps Environmental Laboratory 1987, 2008). Construction and modification of road crossings, control structures, fish barriers, fish passages, and other structures will be designed to minimize effects on waters of the United States and waters of the State, and will employ BMPs to avoid indirect effects on water quality.	Corps
WUS-2. Obtain Permits and Compensate for Any Loss of Wetlands and Other Waters of	The project proponent, in coordination with the Corps, will determine the acreage of effects on waters of the United States and waters of the State that will result from implementation of the SJRRP. The project proponent will adhere to a “no net loss” basis for the acreage of wetlands and other waters of the United States and waters of the State that will be removed and/or degraded. Wetland habitat will	Corps

Table 2-8.
Conservation Measures for Biological Resources That May Be Affected by Project Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Regulatory Agency
the United States/Waters of the State	be restored, enhanced, and/or replaced at acreages and locations and by methods agreed on by the Corps and the Central Valley RWQCB, and DFW, as appropriate, depending on agency jurisdiction. The project proponent will obtain Section 404 and Section 401 permits and comply with all permit terms. The acreage, location, and methods for compensation will be determined during the Section 401 and Section 404 permitting processes. The compensation will be consistent with recommendations in the Fish and Wildlife Coordination Act Report (Appendix F of the PEIS/R).	
INV	**Invasive Plants**	
INV-1. Implement the Invasive Vegetation Monitoring and Management Plan	Reclamation will implement the Invasive Vegetation Monitoring and Management Plan for the SJRRP (Appendix L of the PEIS/R), which includes measures to monitor, control, and where possible eradicate, invasive plant infestations during flow releases and construction activities. The implementation of the Invasive Vegetation Monitoring and Management Plan (Appendix L of the PEIS/R) will include monitoring procedures, thresholds for management responses, success criteria, and adaptive management measures for controlling invasive plant species. The control of invasive weeds and other recommended actions in the Invasive Vegetation Monitoring and Management Plan (Appendix L of the PEIS/R) will be consistent with recommendations in the Fish and Wildlife Coordination Act Report (Appendix F of the PEIS/R).	Reclamation
CP	**Conservation Plans**	
CP-1. Remain Consistent with Approved Conservation Plans	Facility siting and construction activities will be conducted in a manner consistent with the goals and strategies of adopted habitat conservation plans, natural community conservation plans, or other approved local, regional, or State habitat conservation plans to the extent feasible. Coordination shall occur with USFWS and/or DFW, as appropriate.	USFWS DFW
CP-2. Compensate Effects Consistent with Approved Conservation Plans	The project proponent shall compensate effects consistent with applicable conservation plans and implement all applicable measures required by the plans.	USFWS DFW
GS	**Southern Distinct Population Segment of North American Green Sturgeon**	
GS-1. Avoid and Minimize Loss of Habitat And Individuals	The SJRRP will be operated in such a way that actions affecting green sturgeon habitat shall be done in accordance with existing operating criteria of the CVP and SWP, and prevailing and relevant laws, regulations, BOs, and court orders in place when the action(s) are performed.	NMFS
CVS	**Central Valley Steelhead**	
CVS-1. Avoid Loss of Habitat and Risk of	Impacts to habitat conditions (i.e., changes in flows potentially resulting in decreased flows in the tributaries, increases in temperature, increases in pollutant concentration, change in recirculation/recapture	NMFS

Table 2-8.
Conservation Measures for Biological Resources That May Be Affected by Project Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Regulatory Agency
Take of Species	rates and methods, decrease in floodplain connectivity, removal of riparian vegetation, decreased in quality rearing habitat, etc.) must be analyzed in consultation with NMFS. The Hills Ferry Barrier will be operated and maintained to exclude Central Valley steelhead from the Restoration Area during construction activities and until suitable habitat conditions are restored. Maintenance of conservation measures will be conducted to the extent necessary to ensure that the overall long-term habitat effects of the project are positive. Before implementation of site-specific actions, the action agency shall conduct an education program for all agency and contracted employees relative to the Federally listed species that may be encountered within the study area of the action, and required practices for their avoidance and protection. A NMFS-appointed representative shall be identified to employees and contractors to ensure that questions regarding avoidance and protection measures are addressed in a timely manner. Disturbance of riparian vegetation will be avoided to the greatest extent practicable. A spill prevention plan will be prepared describing measures to be taken to minimize the risk of fluids or other materials used during construction (e.g., oils, transmission and hydraulic fluids, cement, fuel) from entering the San Joaquin River or contaminating riparian areas adjacent to the river itself. In addition to a spill prevention plan, a cleanup protocol will be developed before construction begins and shall be implemented in case of a spill. Stockpiling of materials, including portable equipment, vehicles and supplies, such as chemicals, shall be restricted to the designated construction staging areas, exclusive of any riparian and wetland areas. A qualified biological monitor will be present during all construction activities, including clearing, grubbing, pruning, and trimming of vegetation at each job site during construction initiation, midway through construction, and at the close of construction, to monitor implementation of conservation measures and water quality. The San Joaquin River channel shall be designed to decrease or eliminate predator holding habitat, in coordination with NMFS.	
CVS-2. Minimize Loss of Habitat and Risk of Take of Species	In-channel construction activities that could affect designated critical habitat for Central Valley steelhead will be limited to the low-flow period between June 1 and October 1 to minimize potential for adversely affecting Federally listed anadromous salmonids during their emigration period. In-channel construction activities that could affect designated critical habitat for Central Valley steelhead will be limited to daylight hours during weekdays, leaving a nighttime and weekend period of passage for Federally listed fish species. Construction BMPs for off-channel staging, and storage of equipment and vehicles, will be implemented to minimize the risk of contaminating the waters of the San Joaquin River by spilled materials. BMPs will also include minimization of erosion and stormwater runoff, as appropriate. Riparian vegetation removed or damaged will be replaced at a ratio, coordinated with NMFS, within the immediate area of the disturbance to	NMFS

Table 2-8.
Conservation Measures for Biological Resources That May Be Affected by Project Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Regulatory Agency
	maintain habitat quality. If individuals of listed species are observed present within a project area, NMFS must be notified. NMFS personnel shall have access to construction sites during construction, and following completion, to evaluate species presence and condition and/or habitat conditions. If bank stabilization activities should be necessary, then such stabilization shall be constructed to minimize predator habitat, minimize erosion potential, and contain material suitable for supporting riparian vegetation.	
SRCS	**Central Valley Spring-Run Chinook Salmon**	
SRCS-1. Avoid and Minimize Loss of Habitat and Individuals	The SJRRP will be operated in such a way that actions in the vicinity of spring-run Chinook salmon habitat shall be done in accordance with existing operating criteria of the CVP and SWP, and prevailing and relevant laws, regulations, BOs, and court orders in place at the time the actions are performed. SJRRP actions shall be performed in accordance with the Experimental Population 4(d) rule, as it is developed, and where applicable.	NMFS DFW
EFH	**Essential Fish Habitat (Pacific Salmonids)**	
EFH-1. Avoid Loss of Habitat and Risk of Take of Species	Impacts to habitat conditions (e.g., changes in flows potentially resulting in decreased flows in the tributaries, increases in temperature, increases in pollutant concentration, change in recirculation/recapture rates and methods, decrease in floodplain connectivity, removal of riparian vegetation, decreased in quality rearing habitat) must be analyzed in consultation with NMFS. The Hills Ferry Barrier will be operated and maintained to exclude Pacific salmonids from the Restoration Area during construction activities, and until suitable habitat conditions are restored. Under historical operations, the Hills Ferry Barrier is operated September through mid-December. The period of operation under this measure may vary from historical operations. Maintenance of conservation measures will be conducted to the extent necessary to ensure that the overall long-term habitat effects of the project are positive. Before implementation of site-specific actions, the action agency shall conduct an education program for all agency and contracted employees relative to the Federally listed species that may be encountered within the study area of the action, and required practices for their avoidance and protection. A NMFS-appointed representative shall be identified to employees and contractors to ensure that questions regarding avoidance and protection measures are addressed in a timely manner. Disturbance of riparian vegetation will be avoided to the greatest extent practicable. A spill prevention plan will be prepared describing measures to be taken to minimize the risk of fluids or other materials used during construction (e.g., oils, transmission and hydraulic fluids, cement, fuel) from entering the San Joaquin River or contaminating riparian areas adjacent to the river itself. In addition to a spill prevention plan, a cleanup protocol will be developed before construction begins and shall	NMFS

Table 2-8.
Conservation Measures for Biological Resources That May Be Affected by Project Actions

Conservation Measure and Identifier	Applicable Habitat and/or Species, and Conservation Measure Description	Regulatory Agency
	be implemented in case of a spill. Stockpiling of materials, including portable equipment, vehicles and supplies, such as chemicals, shall be restricted to the designated construction staging areas, exclusive of any riparian and wetland areas. A qualified biological monitor will be present during all construction activities, including clearing, grubbing, pruning, and trimming of vegetation at each job site during construction initiation, midway through construction, and at the close of construction to monitor implementation of conservation measures and water quality. The bottom topography of the San Joaquin River channel will be designed to decrease or eliminate predator holding habitat.	
EFH-2. Minimize Loss of Habitat and Risk of Take from Implementation of Construction Activities	In-channel construction activities that could affect habitat for will be limited to the low-flow period between June 1 and October 1 to minimize potential for adversely affecting Federally listed anadromous salmonids during their emigration period. In-channel construction activities that could affect habitat for Pacific salmonids will be limited to daylight hours during weekdays, leaving a nighttime and weekend period of passage for Federally listed fish species. Construction BMPs for off-channel staging and storage of equipment and vehicles will be implemented to minimize the risk of contaminating the waters of the San Joaquin River by spilled materials. BMPs will also include minimization of erosion and stormwater runoff, as appropriate. Riparian vegetation removed or damaged will be replaced, as applicable, in accordance with the Riparian Habitat Monitoring Management and Mitigation Plan, and will be coordinated with the USFWS and NMFS and/or other agencies as appropriate. If individuals of listed species are observed present within a project area, NMFS must be notified. NMFS personnel shall have access to construction sites during construction and following completion to evaluate species presence and condition and/or habitat conditions. If bank stabilization activities should be necessary, then such stabilization shall be constructed to minimize predator habitat, minimize erosion potential, and contain material suitable for supporting riparian vegetation.	NMFS

Acronyms:

°C = degrees Celsius
°F = degrees Fahrenheit
BMP = best management practice
BO = Biological Opinion
CFR = Code of Federal Regulations
cfs = cubic feet per second
CNDDB = California Natural Diversity Database
Corps = U.S. Army Corps of Engineers
CVP = Central Valley Project
DFW = California Department of Fish and Wildlife
DWR = California Department of Water Resources
EPA = Federal Environmental Protection Agency
NMFS = National Marine Fisheries Service
PEIS/R = Program Environmental Impacts Statement/Report
Reclamation = U.S. Department of the Interior, Bureau of Reclamation
RWQCB = Regional Water Quality Control Board
Settlement = Stipulation of Settlement in *NRDC, et al., v. Kirk Rodgers, et al.*
SJRRP = San Joaquin River Restoration Program
State = State of California
SWP = State Water Project
USFWS = U.S. Fish and Wildlife Service

Minimize Flood Risk from Restoration Flows

The Program's strategy for minimizing flood risk is to limit the maximum downstream extent and rate of Restoration Flows for the given reach to then-existing channel capacities. This strategy is incorporated by reference from the PEIS/R (SJRRP 2011a, pages 2-22 through 2-28) and summarized here. These Program-wide commitments are documented in the PEIS/R Record of Decision (ROD). No new Project-level actions to minimize flood risk from Restoration Flows are being proposed.

Throughout Settlement implementation, the maximum downstream extent and rate of Restoration Flows to be released through a reach will be maintained at or below then-existing channel capacities. As channel or structure modifications are completed, maximum Restoration Flow releases will be correspondingly increased in accordance with then-existing channel capacities and with the release schedule. Consistent with the San Joaquin River Restoration Settlement Act, Interim Flows (2009-2014) were reduced, as needed, to address material seepage impacts, as identified through the monitoring program (see the Program's *Physical Monitoring and Management Plan* and *Seepage Management Plan* (PEIS/R Appendices D.1 and D.2, SJRRP 2011a)). If release of water from Friant Dam is required for flood control purposes, concurrent Restoration Flows will be reduced by an amount equivalent to the required flood control release. If flood control releases from Friant exceed the concurrent scheduled Restoration Flows, no additional releases above those required for flood control will be made for SJRRP purposes.

Then-existing channel capacities within the Restoration Area correspond to flows that would not significantly increase flood risk from Interim and Restoration flows in the Restoration Area (see the *Channel Capacity Report* (SJRRP 2015)). The action to release Restoration Flows includes measures that would achieve the following objectives: (1) commit Reclamation to implementing actions that would meet performance standards that minimize increases in flood risk as a result of Restoration Flows, (2) limit the release and conveyance of Restoration Flows to those flows that would remain in-channel until adequate data are available to apply the performance standards and until the performance standards are satisfied, and (3) enable the Settlement to be implemented in coordination with other ongoing and future actions outside of the Settlement that could address channel capacity issues identified in the Settlement or through the SJRRP or other programs. Implementation of measures that achieve these objectives will allow for the safe release and conveyance of Restoration Flows throughout the duration of Settlement implementation.

Reclamation will continue to implement the following three integrated measures that collectively minimize increases in flood risk as a result of Restoration Flows during Settlement implementation:

- **Establish a Channel Capacity Advisory Group and Determine and Update Estimates of Then-Existing Channel Capacities as Needed –** The establishment and administration of a Channel Capacity Advisory Group to provide independent review of estimated then-existing channel capacities, monitoring results, and

management actions to address vegetation and sediment transport within the system as identified by Reclamation.

- **Maintain Restoration Flows at or Below Estimates of Then-Existing Channel Capacities –** The process for limiting Restoration Flows to reduce the risk of levee failure due to underseepage, through-seepage, and associated levee stability issues to less-than-significant levels.
- **Closely Monitor Erosion and Perform Maintenance and/or Reduce Restoration Flows as Necessary to Avoid Erosion-Related Impacts –** The commitment by Reclamation to implement erosion monitoring and management, including monitoring potential erosion sites, reducing Restoration Flows as necessary, and reporting ongoing results of monitoring and management actions to the Channel Capacity Advisory Group.

Only limited data are currently available on San Joaquin River channel capacities and levee conditions. The levee design criteria developed by the Corps and presented in *Design and Construction of Levees Engineering and Design Manual* (Manual No. 1110-2-1913) (Corps 2000a), *Slope Stability* (Manual No. 1110-2-1902) (Corps 2003), and *Design Guidance for Levee Underseepage* (Engineering Technical Letter No. 1110-2-569) (Corps 2005) will be applied throughout the Restoration Area to identify the Restoration Flows that would not cause the levee slope stability Factor of Safety to be reduced below 1.4, or the underseepage Factor of Safety to be reduced below the value corresponding to an exit gradient at the toe of the levee of 0.5. The levee slope stability Factor of Safety is defined as the ratio of available shear strength of the top stratum of the levee slope to the necessary shear strength to keep the slope stable (Corps 2003), and minimum levee slope stability factors of safety are given by the Corps levee criteria shown in Table 2-9. The application of the levee slope stability Factor of Safety of 1.4 is required for federally authorized flood control projects. Through-seepage is calculated as part of the slope stability analysis and does not have a separate Factor of Safety. The underseepage Factor of Safety is defined as a ratio of the critical hydraulic gradient to the actual exit gradient of seepage on the levee. Corps design guidance recommends that the allowable underseepage factor of safety for use in evaluations and/or design of seepage control measures should correspond to an exit gradient at the toe of the levee of 0.5 (in general, this would provide a Factor of Safety of 1.6), but states that deviation from recommended design guidance is acceptable when based and documented on sound engineering judgment and experience (Corps 2005).

Until adequate data are available to determine the Factor of Safety, Reclamation would limit the release of Interim and Restoration flows to those which would remain in-channel. In-channel flows are flows that maintain a water surface elevation at or below the elevation of the landside levee toe (i.e., the base of the levee). When sufficient data are available to determine the Factor of Safety, Reclamation will limit Restoration Flows to levels that would correspond to a Factor of Safety of 1.4 or higher and an underseepage Factor of Safety corresponding to an exit gradient at the toe of the levee of 0.5 or lower at all times. Observation of levee erosion, seepage, boils, impaired emergency levee access, or other indications of increased flood risk identified through ongoing monitoring at potential erosion sites would indicate that the minimum Factor of

Safety is not met and would trigger immediate reductions in Restoration Flows at the site. Such observations would supersede channel capacity estimates, and Restoration Flows will be reduced in areas where these conditions occur.

Table 2-9.
Minimum Factors of Safety - Levee Slope Stability

Type of Slope	Applicable Stability Conditions and Required Factors of Safety			
	End-of-Construction	Long-Term (Steady Seepage)	Rapid Drawdown[a]	Earthquake[b]
New Levees	1.3	1.4	1.0 to 1.2	(see below)
Existing Levees	--	1.4[c]	1.0 to 1.2	(see below)
Other Embankments and Dikes[d]	1.3[e,f]	1.4[c,f]	1.0 to 1.2[f]	(see below)

Source: U.S. Army Corps of Engineers 2000a. Design and Construction of Levees Engineering and Design Manual. Manual No. 1110-2-1913. April. Table 6-1b, page 6-5.

Notes:

[a] Sudden drawdown analyses. F. S. = 1.0 applies to pool levels prior to drawdown for conditions where these water levels are unlikely to persist for long periods preceding drawdown. F. S. = 1.2 applies to pool level, likely to persist for long periods prior to drawdown.

[b] See ER 1110-2-1806 for guidance. An EM for seismic stability analysis is under preparation.

[c] For existing slopes where either sliding or large deformation have occurred previously and back analyses have been performed to establish design shear strengths lower factors of safety may be used. In such cases probabilistic analyses may be useful in supporting the use of lower factors of safety for design.

[d] Includes slopes which are part of cofferdams, retention dikes, stockpiles, navigation channels, breakwater, river banks, and excavation slopes.

[e] Temporary excavated slopes are sometimes designed for only short-term stability with the knowledge that long-term stability is not adequate. In such cases higher factors of safety may be required for end-of-construction to ensure stability during the time the excavation is to remain open. Special care is required in design of temporary slopes, which do not have adequate stability for the long-term (steady seepage) condition.

[f] Lower factors of safety may be appropriate when the consequences of failure in terms of safety, environmental damage and economic losses are small.

Other Environmental Commitments

The Project proponents will implement the following measures to avoid potentially adverse environmental consequences. Many of these measures are consistent with those specified in the PEIS/R ROD.

Air Quality

- The Project proponents will comply with San Joaquin Valley Air Pollution Control District (SJVAPCD) Regulation VIII. Control measures will be implemented to reduce emissions of particulate matter (predominantly dust/dirt) generated by Project activities, including construction and demolition activities, road construction, bulk materials storage, paved and unpaved roads, carryout and track out, and landfill operations. Control measures include phasing work to reduce the amount of surface area disturbed at any one time, applying water to the construction site to limit visual dust emissions, limiting the speed vehicles travel on unpaved access/haul roads, storing and handling bulk materials in such a manner that minimizes visual dust emissions, minimizing carryout and trackout of

soils from unpaved surfaces to paved surfaces, and preparing and implementing a Dust Control Plan.

- The Project proponents will comply with SJVAPCD Rule 9510, "Indirect Source Review," which requires on-site emission reducing design elements and/or the payment of fees that would be used to fund off-site emissions reduction projects. Construction emissions would be reduced onsite by using add-on controls, cleaner fuels, and/or newer lower-emissions equipment, as described in Chapter 4, "Air Quality."
- The Project proponents will implement Mitigation Measures AQ-1A, AQ-1B, AQ-1C, AQ-2, AQ-3A, and AQ-3B, as described in Chapter 4.0, "Air Quality." Implementation of these measures will reduce criteria exhaust emissions from construction equipment, reduce criteria exhaust emissions from material hauling vehicles, offset Project construction emissions through a SJVAPCD voluntary emission reduction agreement, reduce or offset Project emissions, reduce diesel particulate matter emissions from construction equipment, and reduce diesel particulate matter emissions from material hauling vehicles.

Cultural Resources

- The Project proponents will implement Mitigation Measures CUL-1A, CUL-1B, CUL-1C, CUL-1D, CUL-1E, and CUL-2, as described in Chapter 9.0, "Cultural Resources." With implementation of these measures, the Project proponents will comply with Section 106 of the NHPA or equivalent, conduct subsurface testing and/or archaeological monitoring in proximity to identified sites or areas of sensitivity, halt work in the event of an archaeological discovery, plan an intentional site burial preservation in place (where applicable), avoid soil borrowing in the vicinity of known archaeological resources, and follow the Secretary of the Interior's standards for the treatment of historic properties.

Geology and Soils

- Site-specific geotechnical exploration, testing, and analysis will be conducted prior to final design to allow for the characterization of site soils and appropriate design of proposed structures with respect to potentially corrosive soils or subsidence conditions.
- Project proponents will prepare and implement a stormwater pollution prevention plan that complies with applicable Federal regulations concerning construction activities. (This measure is the same as GRW-1A and SQW-1.)
- Excavation of borrow materials will be done in accordance with Reclamation design standards, and comply with provisions of the Clean Water Act Section 402 and the National Pollutant Discharge Elimination System Construction General Permit.

Hydrology – Groundwater

- The Project proponents will implement Mitigation Measures GRW-1A and GRW-1B, as described in Chapter 13.0, "Hydrology – Groundwater." With implementation of these measures, the Project proponents will prepare and implement a stormwater pollution prevention plan and a construction groundwater management plan.

Hydrology – Surface Water Resources and Water Quality

- The Project proponents will implement Mitigation Measures SWQ-1 and SWQ-3, as described in Chapter 14.0, "Hydrology – Surface Water Resources and Water Quality." With implementation of these measures, the Project proponents will develop and implement a stormwater pollution prevention plan and minimize the use of pesticide and herbicide contaminated soil.

Land Use Planning and Agricultural Resources

- The Project proponents will implement Mitigation Measures LU-1, LU-2, LU-3, and LU-5, as described in Chapter 16.0, "Land Use Planning and Agricultural Resources." With implementation of these measures, the Project proponents will preserve agricultural productivity of designated farmland to the extent possible, and notify County planning agencies of general plan and zoning ordinance inconsistencies.

Noise and Vibration

- The Project proponents will implement Mitigation Measures NOI-1, NOI-2, and NOI-3, as described in Chapter 17.0, "Noise and Vibration." Implementation of these measures will reduce temporary and short-term noise levels from construction-related equipment near sensitive receptors, minimize vibration-related effects, and reduce temporary noise levels from construction-related traffic increases near sensitive receptors.

Paleontological Resources

- The Project proponents will implement Mitigation Measures PAL-1, as described in Chapter 18.0, "Paleontological Resources." With implementation of these measures, the Project proponents will stop work if paleontological resources are encountered during earthmoving activities and implement a recovery plan.

Public Health and Hazardous Materials

- The Project proponents will comply with the California Environmental Protection Agency's (Cal/EPA's) Unified Program.
- The Project proponents will comply with Federal, State, and local hazardous materials regulations, as applicable, monitored by the State (e.g., California

Occupational Safety and Health Administration [Cal/OSHA], Department of Toxic Substances Control, California Highway Patrol) and/or local jurisdictions.

- Project proponents will adopt reasonable wildland fire safety strategies and have the firefighting equipment required by Cal/OSHA during all phases of construction.
- The Project proponents will implement Mitigation Measures HAZ-2A, HAZ-2B, HAZ-2C, HAZ-2D, HAZ-2E, HAZ-3, HAZ-4, HAZ-5, and HAZ-6, as described in Chapter 19.0, "Public Health and Hazardous Materials." With implementation of these measures, the Project proponents will follow general hazardous materials guidelines, properly dispose of hazardous building components, properly dispose of pesticides, properly manage discolored or odiferous soils, properly remove underground storage tanks, minimize disturbance to known hazardous material sites, minimize use of pesticide and herbicide contaminated soil, minimize exposure to potential West Nile Virus carrying vectors, minimize exposure to potential Hantavirus vectors, minimize exposure to Valley Fever, and minimize the disturbance of idle or abandoned wells.

Recreation

- The Project proponents will implement Mitigation Measures REC-1 and REC-2, as described in Chapter 20.0, "Recreation." With implementation of these measures, the Project proponents will minimize construction effects on recreation uses and establish boat portage facilities around Project facilities.

Transportation and Traffic

- The Project proponents will comply with Department of Motor Vehicles codes by requiring contractors and employees to be properly licensed and endorsed when operating commercial vehicles.
- The Project proponents will comply with California Vehicle Code section 35551 by enforcing compliance with weight restrictions on vehicles traveling on freeways and highways and by requiring heavy haulers to obtain permits, if required, prior to delivery of any heavy haul load.
- The Project proponents will comply with California Vehicle Code section 35780 by requiring heavy haulers to obtain a Single-Trip Transportation Permit prior to delivery of any oversized load.
- The Project proponents will coordinate with the California Department of Transportation (Caltrans) for relocation of any structures or fixtures necessary to telegraph, telephone, or electric power lines or of any ditches, pipes, drains, sewers, or underground structures located in the public rights-of-way.
- As required by the PEIS/R ROD, Project proponents will prepare and implement a traffic management plan that identifies the number of truck trips, time of day for arrival and departure of trucks, limits on number of truck trips, and traffic circulation control measures. Control measures typically include advertising planned lane closures, warning signage, a flag person to direct traffic flows when

needed, and methods for maintaining continued access by emergency vehicles. During project construction, access to existing land uses will be maintained at all times, with detours used as necessary during road closures. The traffic management plan will be submitted to the appropriate county public works, fire, police, and sheriff departments for comments.

- The Project proponents will implement Mitigation Measures TRA-4A and TRA-4B, as described in Chapter 22.0, "Transportation and Traffic." With implementation of these measures, the Project proponents will provide a temporary roadway and crossing at San Mateo Avenue and use construction sequencing to provide continuous emergency access at Drive 10 ½, where applicable.

Utilities and Service Systems

- As required by the PEIS/R ROD to minimize and avoid disruption of subsurface utilities from ground disturbing activities, Project proponents will (1) confirm the location of existing underground utilities, (2) coordinate with the owners of transmission lines and pipelines, (3) design restoration actions to avoid affecting underground facilities, if feasible, and (4) coordinate with the utility owner to shut off and relocate the utilities, as necessary.
- The location of public utilities will be confirmed and appropriate notifications will be made by contacting utility providers (e.g., power and communication utility service, and irrigation district service) who operate, maintain or own utilities in the Project area.
- Construction contractors will request an underground service alert from Underground Service Alert North in advance of earthmoving activities to locate and avoid underground utilities.
- Solid waste removed from the Project area will be disposed of in a permitted landfill. The operator of the recycling/disposal location will be notified and Project proponents will obtain approval for the type and amount of solid waste that will be generated.

Visual Resources

- The Project proponents will implement Mitigation Measures VIS-1 and VIS-6, as described in Chapter 24.0, "Visual Resources." With implementation of these measures, the Project proponents will minimize visual disruption from construction activities and conform to lighting standards, where applicable.

Permitting

Reclamation will obtain all necessary permits, as required by law. Implementation of the Project may require the permits and approvals described in Table 2-10. In general, Federal and State actions (permit issuance) will require a signed ROD (NEPA) and findings, EIR certification, and Notice of Determination (NOD) documents (CEQA). Additional information on permit acquisition procedures, submittal package

requirements, critical issues, timing, and permit fees is discussed in the Project's Regulatory Compliance TM (SJRRP 2011b).

Table 2-10.
Summary of Permits and Approvals that May be Required for the Project

Agency and Associated Permit or Approval	Lead Agency for Submittal
Corps Clean Water Act Section 404 Individual Permit Rivers and Harbors Act Section 10 Permit Rivers and Harbors Act Section 14 Permit (Section 408) 33 Code of Federal Regulations 208.10	Reclamation
USFWS/NMFS Endangered Species Act Section 7 Consultation Magnuson-Stevens Fisheries Conservation and Management Act	Reclamation
USFWS Fish and Wildlife Coordination Act Report	USFWS/NMFS
SHPO/ACHP National Historic Preservation Act, Section 106	Reclamation
U.S. Coast Guard General Bridge Act and Rivers and Harbors Act Section 9	Reclamation
Central Valley RWQCB Clean Water Act Section 401 Water Quality Certification	Reclamation
SWRCB/Central Valley RWQCB Clean Water Act Section 402 Construction General Permit	Reclamation
SWRCB Amended water rights	Reclamation
CSLC Land Use Lease	Reclamation
SJVAPCD Air Impact Analysis Regulation VIII Dust Control Plan Federal Clean Air Act	Reclamation
Fresno/Madera Counties Williamson Act Contracts Land Use/Zoning	Reclamation

Key:
ACHP = Advisory Council on Historic Preservation
Central Valley RWQCB = Central Valley Regional Water Quality Control Board
Corps = U.S. Army Corps of Engineers
CSLC = California State Lands Commission
NMFS = National Marine Fisheries Service
Reclamation = U.S. Department of the Interior, Bureau of Reclamation
SHPO = State Historic Preservation Officer
SJVAPCD = San Joaquin Valley Air Pollution Control District
SWRCB = State Water Resources Control Board
USFWS = U.S. Fish and Wildlife Service

2.3 Alternatives Considered and Eliminated from Further Consideration

Formulation of a range of Project alternatives for inclusion in this EIS/R began with a review of Settlement provisions for achieving the Restoration and Water Management goals and the Settlement provisions for the Reach 2B and Mendota Pool Bypass

components. This was followed by preparing the purpose, need, and objectives; developing criteria for including actions in the Project alternatives; defining planning and implementation constraints; and identifying related projects and opportunities associated with achieving the purpose and need. These steps were applied to actions identified in Settlement provisions and to comments received during the public scoping process to identify a range of alternatives to be addressed. As a result of this process, several potential actions were eliminated from consideration, and the reasonable range of initial alternatives was identified. This process and the alternatives eliminated from consideration are summarized here and described in greater detail in the Project Description TM, Attachment A – Initial Alternatives Evaluation (SJRRP 2012).

2.3.1 Pre-Initial Options Analysis

Pre-initial options analysis included concepts suggested during the Project scoping meetings and other concepts suggested within the Project team.

Some actions suggested during the scoping process and considered by the Project Team were retained for inclusion in the Project initial options, while others were not retained for inclusion because they would not meet the Project purposes, needs, goals, and objectives. The actions suggested during the scoping process, and associated screening information, are summarized below.

- Mitigation for flood impacts: No alterations to flood management operations or to the service level of existing flood control facilities (such as design capacity and levee stability) are included in the Project. Mitigation of flood risks not generated by the Project would be beyond the scope of the Project. Local flooding conditions would be improved through increased capacity within the channel and floodplain and improved levees. Alterations to existing flood control facilities (such as the Chowchilla Bifurcation Structure) would provide at least the same level of service as the existing features and would require no changes to operations.
- Evaluation and redesign of the Columbia-Mowry Distribution System including facility access, operations and maintenance, pumps, pipelines, and power: Modifications to existing canals, pumps, pipelines, access, and power are limited to those relocations necessary to construct the Project. The Project would not include evaluation or redesign of system components outside of those potentially impacted by the Project.
- No interruption of water deliveries: The Project goals and objectives include providing water deliveries up to 2,500 cfs within Reach 2B from the San Joaquin River to the Mendota Pool; however, the availability to provide the contracted water amounts from any particular source is beyond the scope of the Project.
- Acquire land to support recreation, tourism, flora, fauna, and groundwater recharge: The purpose of the Project does not include independently supporting recreation, tourism, flora (other than riparian habitat), fauna (other than salmon and other native fishes), or groundwater recharge, so land would not be acquired solely for these purposes. However, opportunities may exist to support these functions in conjunction with or incidental to implementation of the Project, and

land acquired to meet the Project purposes, needs, goals, and objectives may also benefit recreation, tourism, flora, fauna, and groundwater recharge.

- Shortening channel distance to reduce levee length and reduce maintenance costs: Shortening of the river channel or the bypass alignments would not meet the purpose and need of the Project and may cause considerable negative effects to habitat, geomorphology, and sediment continuity in the reach that would result from shortening, or straightening, the channel.
- Installing a cutoff channel before the river bends just downstream of the Chowchilla Bifurcation Structure to reduce flooding toward Hwy 180: No alterations to flood management operations are included in the Project, and mitigation for flood risks not generated by the Project would be beyond the scope of the Project. Local flooding conditions could be improved through increased capacity within the channel and floodplain and improved levees.
- Installing a wall across the river in Reach 3 just below Mendota Dam and diverting water to Mendota Pool: This action would not meet the purpose and need of the Settlement as it would not provide a bypass around the Pool.
- Allow salmon in the Pool and Chowchilla Bypass: The extent to which fish would enter or be screened out of the Chowchilla Bypass would be beyond the scope of the Project but will be considered as part of other Program actions. Fish screening upstream of Reach 2B diversions to Mendota Pool was included.
- Include provisions to allow for Mendota Dam maintenance: Maintenance of Mendota Dam as it relates to operating the Project is included (e.g., removing sediment to operate the Short Canal); however, general maintenance of the structure and its equipment is beyond the purpose, need, and scope of the Project.
- Avoid bifurcation of future flows (require all flows from Reach 2A to be conveyed to Reach 3): The Settlement requires Restoration Flows in Reach 2B and in downstream reaches, but it does not require flood conveyance in Reach 2B, and diversion of flood flows into the Chowchilla Bypass is required to meet existing flood operation guidelines. The flexibility to divert flows to Mendota Pool is also required to meet potential Exchange Contract water deliveries.
- Fish screens in Mendota Pool (instead of bypassing the Pool): This action would not meet the purpose and need of the Settlement as it would not provide a bypass around the Pool. In addition, the maintenance, reliability of fish screens for all Pool connections would not perform as well as other alternatives.
- Evaluate all alternatives that avoid impacts to wetlands: The extent of impact to existing wetlands was considered in the alternatives evaluation process.
- Avoid dredging or filling in waters of the United States: Filling in waters of the United States would be minimized to the extent possible and was considered in the alternatives evaluation process.
- Address effects of the Project on Milburn Pond: The Project does not affect Milburn Pond.

- Do not reintroduce salmon in order to protect existing riparian habitat: Existing riparian habitat was considered in the alternatives evaluation process. Not reintroducing salmon would be contrary to the Settlement.

Some additional options exist that were not part of the scoping process, but were also considered by the Project Team and not retained for inclusion in the Project initial options because they would not meet the Project purposes, needs, goals, and objectives. These include the following:

- Construction of levees to withstand a 200-year flood: Eliminated because existing levees in the Project area are not part of the Lower San Joaquin River Flood Control Project and providing 200-year flood protection is beyond the scope of the Project and would create secondary flood impacts upstream and downstream of the Project area.

2.3.2 Pre-Evaluation Screening

During the concept refinement phase of the Project, some of the initial options were revised, refined, or eliminated from further consideration. The concepts considered and eliminated from further consideration prior to the alternatives evaluation are described below. Many concepts were refined or revised during appraisal-level design before moving into the alternatives evaluation; those refinements are described in the Project Description TM Attachment A – Alternatives Evaluation Section 5.2 (SJRRP 2012).

Bottomless Arch Culverts

Bottomless arch culverts were considered in the Initial Options TM as a potential method of improving the crossing at San Mateo Avenue. However, based upon further consideration, bottomless arch culverts were found to be too difficult to implement in the sand bed channel of Reach 2B because the culverts would require substantial undercut for foundation work, the culverts would potentially require a concrete floor to stabilize the structures during high flows, and could have an unacceptable failure rate. In addition, less expensive and equally beneficial options are available (i.e., concrete box culverts).

Corrugated Metal Pipe Culverts

Corrugated metal pipe culverts were considered in the Initial Options TM as a potential method of improving the crossing at San Mateo Avenue. However, based upon further consideration, corrugated metal pipe culverts were found to be difficult to design for the fish passage requirements and they may have a shortened lifespan due to the corrosive nature of the soils in the Project area.

Bridge

A bridge was considered in the Initial Options TM as a potential type of crossing for the San Mateo Avenue crossing. However, based upon further consideration, both a box culvert crossing and a bridge crossing were found to be capable of meeting the fish passage requirements, but the bridge is significantly more expensive. Therefore, the bridge crossing was eliminated from further consideration.

Floodplain Vegetation Types

In the Initial Options TM, several floodplain vegetation types were considered: fully grassed floodplain, forested riparian fringe along the river with a grassed floodplain, and fully forested floodplain. Based upon further review during concept refinement, the floodplain vegetation concept used in the hydraulics modeling was revised to a mosaic type floodplain habitat including a forested riparian fringe along the river and a mixture of grasslands, scrub, and trees on the floodplain. The mosaic floodplain habitat was more typically found along the river historically and can be found in other parts of the San Joaquin Valley today.

Floodplain Recontouring

As part of the Initial Options development, recontouring of the entire floodplain to allow inundation of large areas at lower flows was considered. Based upon further review during concept refinement, this concept provided less or similar benefit as the select floodplain grading included in the Project alternatives. Wholesale recontouring would not increase the habitat diversity on the floodplain and thus would not provide increased benefits to fish. However, it would require excavation of much larger quantities of material and thus would increase costs. Wholesale recontouring also has the potential to decrease the area of inundation and cause erosion along the channel. Wholesale floodplain recontouring was therefore eliminated from further consideration.

Older Levee Setbacks

During concept refinement, the levee alignments presented in the Initial Options TM were refined and revised and one alignment was eliminated: Initial Option FP-1. Initial Option FP-1 was found to not sufficiently meet the Settlement requirements to provide floodplain and riparian habitat in Reach 2B. The other levee alignments were modified to account for property lines, field lines, infrastructure, flow and sediment continuity purposes, and to add a minimum 300-foot buffer, where appropriate, between the channel and levee to protect the levee from lateral channel migration and erosion.

Mendota Dam Removal

The Fisheries Management Workgroup asked the lead agencies to consider removing Mendota Dam as part of the Fresno Slough Dam Initial Alternative. Based upon further consideration and analysis, the lead agencies decided not to remove the dam because it provides a grade control point between Reach 3 and Reach 2B. Without the dam, the channel base level would be lowered and incision could migrate upstream through Reach 2B (Tetra Tech 2011). This could jeopardize passage conditions at the structures in the Project area such as at San Mateo Avenue and Chowchilla Bifurcation Structure where channel grades would potentially be lowered by up to approximately 4.7 feet and 1.9 feet, respectively, effectively relocating the grade-control point. Lowering the base-level would also eliminate overbank flow during all but the highest flows (Tetra Tech 2011). Furthermore, structural stability of existing and proposed structures could be compromised by the decreased bed elevations and resulting scour.

Floating Picket Weir

A floating picket weir was considered in the Initial Options TM as a potential method of providing a fish exclusion barrier at the downstream end of the Mendota Pool Bypass

Channel to direct fish into the Bypass. Based upon further consideration, this option was eliminated due to the magnitude of flows expected to be seen at the barrier location and this type of weir not being appropriate for such high flows.

Behavioral Barrier

Behavioral fish barriers were investigated during the appraisal-level design as a means of providing an exclusion/directional barrier at the downstream end of the Mendota Pool Bypass Channel to direct upmigrating adult salmon into the bypass channel and away from the base of Mendota Dam. A system to reroute irrigation flows from Mendota Dam to downstream of the barrier would be included with this concept, leaving slack water between the end of the bypass channel and the Dam. Behavioral barrier systems are a developing technology, but two main types of barriers have been implemented on other rivers: electric barriers and acoustic barriers. Both types of barriers have significant drawbacks for implementation in the Project.

Electric barriers generate an electric current through the water across a channel in order to deter fish. Based on existing and previous installations, electric barriers were found to present potential unavoidable electric shock hazards for fish (target and non-target species), other animals, people, and watercraft. Often target fish species either made it past the barrier or were killed. Velocities and depths need to be consistent for the barrier to be effective; something that has proven difficult on reaches with moveable beds and those with variable flows. Velocities also need to be sufficient to sweep stunned fish out of the barrier, which may be difficult in the low slope, low velocity Reach 3. Some programs are considering replacing their electric barriers with different technologies. For all these reasons, the electric barrier is not recommended.

Acoustic barriers use a sound signal contained in a bubble curtain of air to deter fish; acoustic barriers may also incorporate the use of strobes and lights to deter fish. There are few existing installations of acoustic barriers, but they have been found to be most effective on juvenile fish with minimal effectiveness on adult fish. Effectiveness has also been found to decrease with increasing flows. Acoustic barrier technology is not capable of functioning during high flows such as flood releases from Pine Flat routed down Fresno Slough into Reach 3 (typically at 4,500 cfs or reach capacity). These high flows occur on an average annual frequency of 1 in 5 years, typically in wet years. Since the purpose of the Mendota Pool Bypass Barrier is to direct adult migrating salmon into the bypass at all flows, including flood flows, the acoustic barrier is not recommended.

Velocity Barrier

Based on design and hydraulic analyses, a velocity barrier at the downstream end of the Mendota Pool Bypass Channel was eliminated from further consideration because the resulting barrier would be higher than Mendota Dam, would increase the elevation in Mendota Pool between 4 and 5 feet, and would necessitate improvements to all levees on Mendota Pool and Fresno Slough.

Other Types of Fish Screens

During the appraisal-level design several types of fish screens were reviewed for their applicability to the Project for screening fish from the 2,500 cfs diversion to Mendota

Pool. The following screen design types were eliminated from further consideration due to design constraints. Horizontal flat plate screens (patented by Farmers Irrigation District in Oregon) were eliminated because they are intended for use with smaller diversions (less than 100 cfs); there are no physical model studies or field applications demonstrating that this design is capable of handling larger diversions. Traveling screens were eliminated because maintenance is a significant problem, and there are no known field applications for diversions of the Project's size. Box screens were eliminated because, while they can be sized for larger applications, they function very similarly to cylindrical screens which were considered further. Pump screens were eliminated because they are only applicable to very small diversions (less than 10 cfs).

Pump Diversion to Mendota Pool

All the proposed alternatives divert water to Mendota Pool via gravity. During the appraisal-level design, a pump diversion was also considered and preliminary costs were developed. The pump diversion was eliminated from further consideration because the capital improvement costs are nearly four times the cost of the gravity diversions. In addition, the pump diversion would rely on Mendota Dam or another barrier to form a backwatered pool, so the pump diversion would not be able to eliminate the need for a fish passage structure.

2.3.3 Initial Alternatives Screening

Two floodplain initial alternatives and two bypass initial alternatives were included in the Project description based on their comparatively better performance in the alternatives evaluation. The included alternatives were FP-2 (now called the narrow floodplain), FP-4 (now called the wide floodplain), Compact Bypass, and Fresno Slough Dam. The results of the alternatives evaluation and the initial alternatives recommended for elimination are described in the Project Description TM Attachment A – Alternatives Evaluation Section 8.0 (SJRRP 2012).

Three initial alternatives were eliminated from consideration based on the evaluation results: FP-1, FP-5, and the Settlement Alignment. These initial alternatives were eliminated because they perform relatively poorly when compared to the other initial alternatives. The remaining initial alternatives (FP-2, FP-3, FP-4, Compact Alignment, and Fresno Slough Dam) provide a better balance between benefits and impacts.

FP-1 would result in a confined channel system with high velocities and scour along the corridor requiring expensive bank revetment. Vegetation could be difficult to establish, and water depths would often be too deep to provide effective floodplain rearing and primary production benefits. Based on the results of the evaluation, FP-1 performs poorly for several reasons:

- Relatively low amounts of rearing habitat.
- Poor quality shallow water habitat.
- Relatively high capital improvement costs.
- Relatively low amounts of restoration area.

- Relatively greater risk of channel instability.
- Relatively larger nuisance seepage impacts.

FP-5 would result in large areas too shallow and dry to provide effective floodplain rearing and primary production benefits. Based on the results of the evaluation, FP-5 performs poorly for several reasons:

- Poor quality shallow water habitat.
- Relatively high restoration and land costs.
- Relatively greater land removed from production.
- Limited additional fish habitat and passage benefits for the added costs.
- Potential for fish strandings.

The Settlement Alignment provides less habitat than the Compact Alignment but with higher costs and larger land requirements. Based on the results of the evaluation, the Settlement Alignment performs poorly for several reasons:

- No additional shallow water or rearing habitat.
- Relatively high capital improvement costs.
- Relatively less restoration area.
- Relatively greater risk of channel instability.
- Relatively greater land removed from production.

One option was recommended for elimination from consideration based on the evaluation results: Bend 10 Columbia Canal Relocation. This option was recommended for elimination because it performs relatively poorly when compared to the Bend 10 levee revetment, which provides a better balance between benefits and impacts.

Based on the results of the evaluation, the Bend 10 Columbia Canal Relocation option performs poorly for several reasons:

- Additional land acquisition is required.
- More land removed from production.
- Relatively greater environmental impacts.

3.0 Considerations for Describing the Affected Environment and Environmental Consequences

The Project study area is broadly defined to ensure evaluation of potential direct, indirect, and cumulative effects. The areas where direct, indirect, and cumulative effects may occur differ according to resource area; therefore, the geographic range described varies by resource. Resources are generally described in relatively more detail where direct effects may occur and in relatively less detail where indirect effects are anticipated. The information in this chapter was obtained from technical studies prepared by the U.S. Department of the Interior, Bureau of Reclamation (Reclamation). Additional information was obtained from published environmental and planning documents, books, journals articles, websites, field surveys, and communications with technical experts. Descriptions of the affected environment are organized geographically.

3.1 Study Area

The study area for this Environmental Impact Statement/Report (EIS/R) includes areas that may be affected directly, indirectly, or cumulatively by implementing Project alternatives. The study area has been broadly defined to ensure evaluation of potential effects within the following geographic subareas:

- Upstream reaches (e.g., Reach 2A).
- Reach 2B, Downstream reaches (e.g., Reach 3).
- Chowchilla Bypass.
- Delta-Mendota Canal.
- Mendota Pool.
- Fresno Slough.

Operational impacts could result in these geographic subareas under the Project alternatives. Construction-related impacts would result in the Project area under the Project alternatives. Construction-related impacts would not result in other geographic subareas. The geographic subareas are described briefly below.

3.1.1 Reach 2

Reach 2 begins at Gravelly Ford and extends approximately 24 miles downstream to the Mendota Pool, continuing the boundary between Fresno and Madera counties. This reach is a meandering, low-gradient channel. Reach 2 is subdivided at the Chowchilla Bifurcation Structure into two subreaches, Reach 2A (upstream) and Reach 2B

(downstream). Except for the area backwatered by Mendota Dam, prior to Interim Flows, both Reach 2A and Reach 2B were dry in most months. Reach 2A is subject to extensive seepage losses. Reach 2B is a sandy channel with limited conveyance capacity.

3.1.2 Reach 3

Reach 3 begins at Mendota Dam and extends approximately 23 miles downstream to Sack Dam. Reach 3 conveys flows of up to 800 cubic feet per second (cfs) from the Mendota Pool for diversion to the Arroyo Canal at Sack Dam, maintaining year-round flow in a meandering channel with a sandy bed. Flood flows from the Kings River are conveyed to Reach 3 via Fresno Slough and Mendota Dam. This reach continues the boundary between Fresno and Madera counties. The sandy channel meanders through a predominantly agricultural area, and diversion structures are common in this reach.

3.1.3 Chowchilla Bypass

The Chowchilla Bifurcation Structure at the head of Reach 2B regulates the flow split between the San Joaquin River and the Chowchilla Bypass. The Chowchilla Bifurcation Structure consists of two control structures: one at the head of the Chowchilla Bypass and one across the San Joaquin River at RM 216 (see Figure 3-1). The structure is operated depending on flows in the San Joaquin River, flows from the Kings River system via Fresno Slough, water demands in Mendota Pool, and seasonality. Tributaries to the Chowchilla Bypass include the Fresno River and Berenda Slough. The Chowchilla Bypass extends to the confluence of Ash Slough, which marks the beginning of the Eastside Bypass.

3.1.4 Delta-Mendota Canal

The Delta-Mendota Canal conveys water from the Jones Pumping Plant in the south Delta to agricultural lands in the San Joaquin Valley. Water not delivered directly from the Delta-Mendota Canal is diverted at the O'Neill Pumping Plant and O'Neill Forebay for delivery via the San Luis Canal to Central Valley Project (CVP) contractors in the San Joaquin Valley, or to storage in San Luis Reservoir for later use. Most of the rest of the water continues to the south Central Valley, with some water diverted to Santa Clara County.

3.1.5 Mendota Pool

Mendota Pool is the reservoir created by Mendota Dam and has both a San Joaquin River arm and a Fresno Slough arm (see Figure 3-2). The San Joaquin arm of Mendota Pool is the portion of Reach 2B that extends from Mendota Dam to the San Mateo Avenue crossing. The Fresno Slough arm of Mendota Pool extends several miles south of the San Joaquin River. The pool serves as a distribution point for irrigation water supplies delivered by the Delta-Mendota Canal and for refuge water supply to the Mendota Wildlife Area. Mendota Pool provides no long-term storage for water supply operations or flood management.

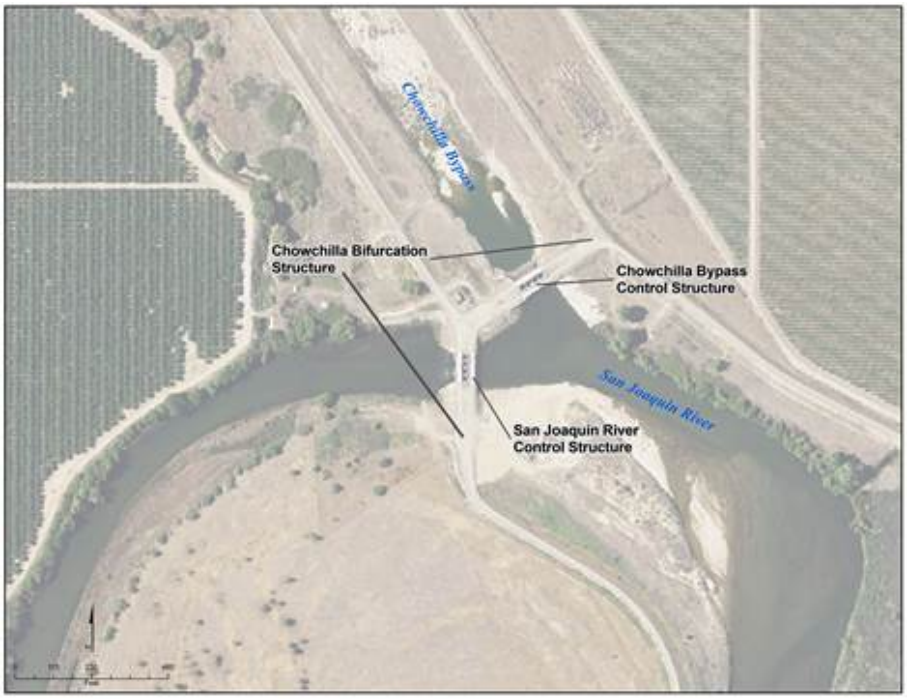


Figure 3-1.
Chowchilla Bifurcation Structure

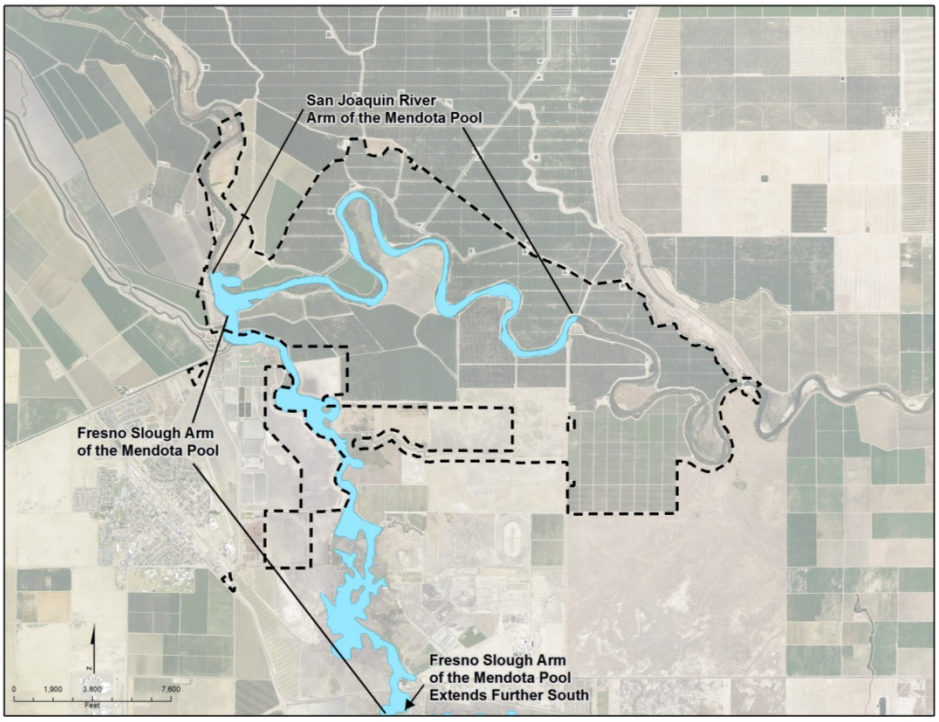


Figure 3-2.
Mendota Pool

Mendota Pool delivers water to the San Joaquin River Exchange Contractors Water Authority, other CVP contractors, wildlife refuges and management areas, and State water contractors. Water delivered to Mendota Pool from the Delta-Mendota Canal is withdrawn at seven canal or pump locations in the pool, leaving about 500 cfs to be discharged down the San Joaquin River for delivery to the Arroyo Canal, which is located about 23 miles downstream from Mendota Dam.

3.1.6 Fresno Slough

Fresno Slough is a distributary of the North Fork of the Kings River and is an intermittent stream that flows northwesterly to the San Joaquin River. James Bypass is a constructed channel that bypasses a portion of Fresno Slough. Flows in the North Fork of the Kings River consist primarily of flood releases from Pine Flat Dam located about 55 miles to the east of the confluence of Fresno Slough and the San Joaquin River. Kings River flood flows can enter Mendota Pool via Fresno Slough/James Bypass. Flows from the Kings River are regulated by Pine Flat Dam releases and the Crescent Weir.

3.2 Chapter Contents and Definition of Terms

Chapters 4.0 through 24.0 include the environmental and regulatory setting for 21 resource topics, as well as discussions of methods, significance criteria, environmental impacts, and mitigation measures for direct and indirect impacts, organized by resource topic. Chapter 25.0 discusses cumulative effects, Chapter 26.0 discusses other disclosures required by National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), including the Mitigation Monitoring and Reporting Program (MMRP). The NEPA/CEQA requirements are summarized in the following subsection, followed by an overview of the content of Chapters 4.0 through 24.0.

3.2.1 NEPA and CEQA Requirements

The NEPA/CEQA requirements for the environmental setting and consequences sections are similar, but not identical. These requirements are summarized below. This section also presents the organization and general assumptions used in the environmental analysis contained in this EIS/R. The reader is referred to the individual technical sections regarding specific assumptions, methodology, and significance criteria (thresholds of significance) used in the analyses.

Environmental Setting

Council on Environmental Quality (CEQ) Regulations specify that an Environmental Impact Statement (EIS) “shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration. The descriptions shall be no longer than necessary to understand the effects of the alternatives. Data and analyses in a statement shall be commensurate with the importance of an impact, with less important material summarized, consolidated, or simply referenced” (40 Code of Federal Regulations [CFR] 1502.15).

Section 15125, subdivision (a) of the State CEQA Guidelines states an Environmental Impact Report (EIR) “must include a description of the physical environment conditions

in the vicinity of the project, as they exist at the time that the notice of preparation is published, or if no notice of preparation is published, at the time the environmental analysis is commenced, from both a local and regional perspective. This environmental setting will normally constitute the baseline physical conditions by which the lead agency determines whether an impact is significant. The description of the environmental setting shall be no longer than is necessary to an understanding of the significant effects of the proposed project and its alternatives."

Environmental Consequences

The CEQ Regulations specify that a Federal agency preparing an EIS must consider the effects of the proposed action and alternatives on the environment; these include effects on ecological, aesthetic, historical, and cultural resources and economic, social, and health effects. Environmental effects are categorized as direct, indirect, and cumulative effects (defined below in Section 3.3.3). An EIS must also discuss possible conflicts with the objectives of Federal, State, regional, and local land use plans, policies, and controls for the area concerned; energy requirements and conservation potential; urban quality; the relationship between short-term uses of the environment and long-term productivity; and irreversible or irretrievable commitments of resources. An EIS must identify relevant, reasonable mitigation measures that are not already included in the proposed action or alternatives to the proposed action that could avoid, minimize, rectify, reduce, eliminate, or compensate for the project's adverse environmental effects (40 CFR 1502.14, 1502.16, 1508.8).

The State CEQA Guidelines explain that the environmental analysis for an EIR must evaluate impacts associated with the project and identify mitigation for any potentially significant impacts. All phases of a proposed project, including development and operation, are evaluated in the analysis. Section 15126.2, subdivision a, of the State CEQA Guidelines states in part:

> *An EIR shall identify and focus on the significant environmental effects of the proposed project. In assessing the impact of a proposed project on the environment, the Lead Agency should normally limit its examination to changes in the existing physical conditions in the affected area as they exist at the time the notice of preparation is published, or where no notice of preparation is published, at the time environmental analysis is commenced. Direct and indirect significant effects of the project on the environment shall be clearly identified and described, giving due consideration to both the short-term and long-term effects. The discussion should include relevant specifics of the area, the resources involved, physical changes, alterations to ecological systems, and changes induced in population distribution, population concentration, the human use of the land (including commercial and residential development), health and safety problems caused by the physical changes, and other aspects of the resource base such as water, historical resources, scenic quality, and public services. The EIR shall also analyze any significant environmental effects the*

> *project might cause by bringing development and people into the area affected…*

An EIR must also discuss inconsistencies between the proposed project and applicable general plans, specific plans, and regional plans (State CEQA Guidelines, § 15125, subd. (d)). An EIR must describe feasible measures that could minimize significant adverse impacts, and the measures must be fully enforceable through permit conditions, agreements, or other legally-binding instruments (State CEQA Guidelines, § 15126.4, subds. (a)(1) & (a)(2)). Mitigation measures are not required for effects that are found to be less than significant (State CEQA Guidelines, § 15126.4, subd. (a)(3)); however, this does not preclude a CEQA lead agency from adopting such mitigation measures as long as the mitigation measures are consistent with all applicable constitutional requirements as specified in State CEQA Guidelines section 15126.4, subdivision (a)(4). Mitigation measures related to historic resources and greenhouse gas (GHG) emissions are discussed in State CEQA Guidelines section 15126.4, subdivisions (b) and (c), respectively.

For Chapters 4.0 through 24.0, an "Impact Assessment Methodology" subsection is provided. This subsection describes the methods, processes, procedures, and/or assumptions used to formulate and conduct the impact analysis for each specific resource topic.

3.2.2 Significance Criteria

Significance criteria (or "thresholds of significance") are used to define the level at which an impact would be considered significant in accordance with CEQA. The thresholds applied in this joint NEPA/CEQA document encompass the factors taken into account under NEPA to determine the significance of an action in terms of its context and intensity of its effects, and also meet the more specific requirements of CEQA for significance thresholds.

Thresholds may be quantitative or qualitative; they may be based on agency or professional standards or on legislative or regulatory requirements that are relevant to the impact analysis. Generally, however, thresholds of significance are derived from Appendix G of the State CEQA Guidelines, as amended, and NEPA, where defined. Significance criteria used in this EIS/R are based on the checklist presented in Appendix G of the State CEQA Guidelines; factual or scientific information and data; and regulatory standards of Federal, State, regional, and local agencies. These thresholds also include the factors taken into account under NEPA to determine the significance of the action in terms of the context and the intensity of its effects.

An environmental document prepared to comply with CEQA must identify the significance of the environmental effects of a proposed project. Therefore, for each effect (impact), a conclusion is provided regarding its significance. A "'significant effect on the environment' means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project…" (State CEQA Guidelines, § 15382).

3.2.3 Impact Comparisons and Definitions

Under CEQA, the environmental analysis compares the alternatives under consideration, including the No-Project Alternative (referred to in this EIS/R as the No-Action Alternative), to existing conditions, defined at the time when the Notice of Preparation was published (July 13, 2009). Under NEPA, the effects of the alternatives under consideration, including the No-Action Alternative, are determined by comparing effects between alternatives and against effects from the No-Action Alternative. Consequently, baseline conditions differ between NEPA and CEQA. Under NEPA, the No-Action Alternative (i.e., expected future conditions without the project) is the baseline to which the Action Alternatives are compared, and the No-Action Alternative is compared to existing conditions. Under CEQA, existing conditions are the baseline to which all alternatives are compared.

Project impacts fall into the following categories:

- A **temporary impact** would occur only during construction. The environmental analysis addresses potentially significant impacts from the direct impact of construction at the project site, direct impact associated with site development, and indirect construction impacts associated with fill and wetland construction activities, construction traffic, etc.
- A **short-term impact** would last from the time construction ceases to within 3 years following construction.
- A **long-term impact** would last longer than 3 years following construction. In some cases, a long-term impact could be considered a permanent impact.
- A **direct impact** is an impact that would be caused by an action and would occur at the same time and place as the action.
- An **indirect impact** is an impact that would be caused by an action but would occur later in time, or at a distance that is removed from the project area (e.g., growth-inducing effects and other changes related to changes in land use patterns, and related effects on the physical environment), yet is reasonably foreseeable in the future.
- A **residual impact** is an impact that would remain after the application of mitigation.
- A **cumulative impact** is an impact taken together with other past, present, and probable future projects producing related impacts, or when two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. A cumulative impact occurs from the change in the environment which results from the incremental impact of a project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time. Cumulative impacts are discussed in Chapter 25.0, “Cumulative Impacts.”

Impacts (and associated mitigation measures as necessary) are listed numerically and sequentially throughout each section. A statement summarizing the impact precedes the discussion of each impact. The discussion that follows the summary statement includes the analysis on which a conclusion is based regarding the significance of the impact. If the discussion is succinct, it is included in its entirety in the summary statement, and is not provided separately.

3.2.4 Impact Levels

This EIS/R uses the following terminology based on CEQA to denote the significance of each environmental effect (impact), and includes consideration of the "context" of the action and the "intensity" (severity) of its effects in accordance with NEPA guidance (40 CFR 1508.27) (CEQ Regulations for implementing NEPA do not require significance determinations):

- **No impact** indicates that the construction, operation, and maintenance of the action alternatives would not have any direct or indirect impacts on the environment. It means that no change from existing conditions would result. This impact level does not require mitigation.
- A **beneficial effect** is one that would result in a beneficial change in the physical environment. This impact level does not require mitigation.
- **A less-than-significant impact** is one that would not result in a substantial or potentially substantial adverse change in the physical environment. This impact level does not require mitigation, even if applicable measures are available, under CEQA.
- A **significant impact** is defined by CEQA as one that would cause "a substantial, or potentially substantial, adverse change in the environment" (Pub. Resources Code, § 21068). Levels of significance can vary by alternative, based on the setting and the nature of the change in the existing physical condition. Under CEQA, mitigation measures or alternatives to the proposed action must be provided, where applicable, to avoid or reduce the magnitude of significant impacts.
- A **potentially significant impact** is one that, if it were to occur, would be considered a significant impact as described above; however, the occurrence of the impact cannot be immediately determined with certainty. For CEQA purposes, a potentially significant impact is treated as if it were a significant impact. Therefore, under CEQA, mitigation measures or alternatives to the proposed action must be provided, where necessary and applicable, to avoid or reduce the magnitude of significant impacts.
- An impact may have a level of significance that is too uncertain to be reasonably determined, which would be designated **too speculative for evaluation**, in accordance with State CEQA Guidelines section 15145. Where some degree of evidence points to the reasonable potential for a significant effect, the EIS/R may explain that a determination of significance is uncertain, but is still assumed to be "potentially significant," as described above. In other circumstances, after thorough investigation, the determination of significance may still be too

speculative to be meaningful. This is an effect for which the degree of significance cannot be determined for specific reasons, such as because aspects of the impact itself are either unpredictable or the severity of consequences cannot be known at this time.

3.2.5 Mitigation Measures

Mitigation measures are presented, where feasible, to avoid, minimize, rectify, reduce, or compensate for significant and potentially significant impacts of the Action Alternatives, in accordance with the State CEQA Guidelines section 15126.4 and NEPA regulations (40 CFR 1508.20). Mitigation measures are not required for impacts identified under the No-Action Alternative because approving agencies would not be required to obtain permits or agreements if the agencies chose not to approve the project. For these reasons, mitigation measures are not provided for the No-Action Alternative even if significant impacts may result. Furthermore, no mitigation measures are proposed when an impact conclusion is "**less than significant**," "**no impact**," or "**beneficial**."

Mitigation measures are identified for project-level actions. Mitigation measures are presented in their entirety for significant and potentially significant project-level impacts and, in accordance with section 15126.4 of the State CEQA Guidelines, are fully enforceable through permit conditions, agreements, or other legally-binding instruments.

Section 15370 of the State CEQA Guidelines defines mitigation as follows:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments.

In accordance with Public Resources Code section 21081.6, subdivision (a), if a State agency approves the project actions, that agency would adopt a reporting or monitoring program at the time that it makes its CEQA findings. The purpose of the MMRP (see Chapter 26.0) is to ensure that the mitigation measures adopted as part of project approval would be complied with during project construction and implementation. The MMRP would identify each of the mitigation measures for project-level actions, and describe the party responsible for monitoring (Reclamation, California State Lands Commission, or other, as appropriate), the time frame for implementation, and the program for monitoring compliance.

3.2.6 Significance After Mitigation

For each significant and potentially significant impact, following the presentation of proposed mitigation measures, the significance of the impact after mitigation is stated.

Where sufficient feasible mitigation is not available to reduce impacts to a less-than-significant level, the impacts are identified as "significant and unavoidable." Under State CEQA Guidelines section 15091, subdivision (a), a public agency cannot approve or carry out a project for which an EIR has been certified which identifies one or more significant environmental effects of the project unless the public agency makes one or more written findings for each of those significant effects, accompanied by a brief explanation of the rationale for each finding. In accordance with State CEQA Guidelines section 15093, when an agency approves a project which will result in the occurrence of significant effects which are identified in the Final EIR but are not avoided or substantially lessened, the agency shall make a "statement of overriding considerations" supported by substantial evidence in the record that states in writing the specific reasons to support its action based on the final EIR and/or other information in the record.

For the No-Action and Action Alternatives, significant and unavoidable impacts are also summarized in Chapter 27.0, "Other NEPA and CEQA Considerations."

3.2.7 Relationship between Short-Term Uses of the Environment and Maintenance and Enhancement of Long-Term Productivity

NEPA requires that an EIS include a discussion of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. For the No-Action and Action Alternatives, this discussion is provided in Chapter 26.0, "Other NEPA and CEQA Considerations."

3.2.8 Irreversible and Irretrievable Commitments of Resources

NEPA requires that an EIS include a discussion of the irreversible and irretrievable commitments of resources that may be involved if the project is implemented. Similarly, the State CEQA Guidelines requires the identification and analysis of significant irreversible environmental changes that would be involved if the project is implemented. For joint CEQA/NEPA documents, the EIS/R must analyze and justify the extent to which the Project will commit nonrenewable resources to uses that future generations will probably be unable to reverse (Pub. Resources Code, § 21100(a); State CEQA Guidelines, §§ 15126, Subd. (c), 15126.2, Subd. (c), and 15127).

The irreversible and irretrievable commitment of resources is the permanent loss of resources for future or alternative purposes. Irreversible and irretrievable commitments of resources occur when resources cannot be recovered or recycled or when resources are consumed or reduced to unrecoverable forms. For the No-Action and Action Alternatives, irreversible and irretrievable commitments of resources are discussed in Section 26.3, "Irreversible and Irretrievable Commitments of Resources."

3.3 Resources Eliminated from Further Analysis

CEQA and the State CEQA Guidelines provide for the identification and elimination from detailed study the issues that are not significant or that have been covered by prior environmental review (Pub. Resources Code, § 21002.1, State CEQA Guidelines, § 15143). The CEQ Regulations provide similar provisions (40 CFR 1501.7(a)(3)).

During initial scoping with the public and governmental agencies, and based on information obtained through literature review, agency correspondence, consultations, and field data collection, it was determined that Indian Trust Assets could be eliminated from detailed study because Indian Trust Assets are not found in the Project area. Therefore, with the exception of Indian Trust Assets, all other resource areas covered by NEPA and CEQA are addressed in this EIS/R.

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4.0 Air Quality

This chapter describes the environmental and regulatory setting for air quality, as well as environmental consequences and mitigation, as they pertain to implementation of the Project alternatives. Greenhouse gas emissions are discussed in Chapter 8.0, "Climate Change and Greenhouse Gas Emissions." The discussion of existing conditions and the potential impacts of the Project alternatives on air quality encompass Reach 2B, Fresno and Madera counties, and the San Joaquin Valley Air Basin (SJVAB).

4.1 Environmental Setting

The Project area and vicinity are located in Fresno and Madera counties, which are part of the SJVAB. The SJVAB also comprises all of Merced, Kings, San Joaquin, Stanislaus, and Tulare counties and the valley portion of Kern County.

4.1.1 Ambient Air Quality

Ambient concentrations of air pollutants, contaminants, and odors are determined by the amount of emissions released by sources and the atmosphere's ability to transport and dilute such emissions. Natural factors which affect transport and dilution include terrain, wind, atmospheric stability, and the presence of sunlight. Therefore, existing air quality conditions in the area are determined by such natural factors as topography, meteorology, and climate, in addition to the amount of emissions released by existing sources, as discussed separately below.

Climate, Meteorology, and Topography

The SJVAB, which occupies the southern half of the Central Valley, is approximately 250 miles long and, on average, 35 miles wide. The SJVAB is a well-defined climatic region with distinct topographic features on three sides. The Coast Range is located on the western border of the SJVAB. The San Emigdio Mountains, which are part of the Coast Range, and the Tehachapi Mountains, which are part of the Sierra Nevada, are both located on the south side of the SJVAB. The Sierra Nevada forms the eastern border of the SJVAB. The northernmost portion of the SJVAB is San Joaquin County. There is no topographic feature delineating the northern edge of the basin. The SJVAB can be considered a "bowl" open only to the north.

The SJVAB is basically flat with a downward gradient in terrain to the northwest. Air flows into the SJVAB through the Carquinez Strait, the only breach in the western mountain barrier, and moves across the Sacramento–San Joaquin Delta from the San Francisco Bay area. The mountains surrounding the SJVAB create a barrier to airflow, which leads to the entrapment of air pollutants when meteorological conditions are unfavorable for transport and dilution. As a result, the SJVAB is highly susceptible to pollutant accumulation over time.

The inland Mediterranean climate type of the SJVAB is characterized by hot, dry summers and cool, rainy winters. The climate is a result of the topography and the strength and location of a semi-permanent, subtropical high-pressure cell. During summer, the Pacific high-pressure cell is centered over the northeastern Pacific Ocean resulting in stable meteorological conditions and a steady northwesterly wind flow. Cold ocean water upwells from below to the surface because of the northwesterly flow, producing a band of cold water off the California coast.

Daily summer high temperatures often exceed 100 degrees Fahrenheit (°F), averaging in the low 90s in the north and high 90s in the south. In the entire SJVAB, daily summer high temperatures average 95ºF. Over the last 30 years, temperatures in the SJVAB averaged 90°F or higher for 106 days a year, and 100°F or higher for 40 days a year. The daily summer temperature variation can be as high as 30°F (San Joaquin Valley Air Pollution Control District [SJVAPCD] 2002). In winter, the Pacific high-pressure cell weakens and shifts southward, resulting in wind flow offshore and allowing storm systems to move in from the Pacific Ocean. Average high temperatures in the winter are in the 50s, but lows in the 30s and 40s can occur on days with persistent fog and low cloudiness. The average daily low temperature in the winter is 45°F (SJVAPCD 2002).

A majority of the precipitation in the SJVAB occurs as rainfall during winter storms. The rare occurrence of precipitation during the summer is in the form of convective rain showers. The amount of precipitation in the SJVAB decreases from north to south primarily because the Pacific storm track often passes through the northern portion of the SJVAB, while the southern portion remains protected by the Pacific high-pressure cell. Stockton, in the north, receives about 20 inches of precipitation per year, while Fresno, in the center, receives about 10 inches per year, and Bakersfield, at the southern end of the valley, receives less than 6 inches per year. Average annual rainfall for the entire SJVAB is approximately 9.25 inches on the valley floor (SJVAPCD 2002).

The winds and unstable atmospheric conditions associated with the passage of winter storms result in periods of low air pollution and excellent visibility. Precipitation and fog tend to reduce or limit some pollutant concentrations. For instance, clouds and fog block sunlight, which is required to fuel photochemical reactions that form ozone. Because carbon monoxide (CO) is partially water-soluble, precipitation and fog also tend to reduce concentrations in the atmosphere. In addition, respirable particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}) can be washed from the atmosphere through wet deposition processes (e.g., rain). However, between winter storms, high pressure and light winds lead to the creation of low-level temperature inversions and stable atmospheric conditions resulting in the concentration of air pollutants (e.g., CO and PM_{10}).

Summer is considered the ozone season in the SJVAB. This season is characterized by poor air movement in the mornings and by longer daylight hours, which provide a plentiful amount of sunlight to fuel photochemical reactions between reactive organic gases (ROG) and nitrogen oxides (NO_X), which result in ozone formation. During the summer, wind speed and direction data indicate that summer wind usually originates at

the north end of the San Joaquin Valley and flows in a south-southeasterly direction through Tehachapi Pass and into the Southeast Desert Air Basin (SJVAPCD 2002).

Criteria Air Pollutants

Concentrations of ozone, CO, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), PM_{10}, fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less ($PM_{2.5}$), and lead are used as indicators of ambient air quality conditions. Because these are the most prevalent air pollutants known to be deleterious to human health, and because there is extensive documentation available on health-effects criteria for these pollutants, they are commonly referred to as "criteria air pollutants."

A brief description of each criteria air pollutant, including source types, health effects, and future trends, is provided below along with the most current attainment area designations and monitoring data for the Project area and vicinity.

Ozone

Ozone is a photochemical oxidant, a substance whose oxygen combines chemically with another substance in the presence of sunlight, and the primary component of smog. Ozone is not directly emitted into the air, but is formed through complex chemical reactions between precursor emissions of ROG and NO_X in the presence of sunlight. ROG are volatile organic compounds that are photochemically reactive. ROG emissions result primarily from incomplete combustion and the evaporation of chemical solvents and fuels. NO_X are a group of gaseous compounds of nitrogen and oxygen that results from the combustion of fuels. As a highly reactive molecule, ozone readily combines with many different components of the atmosphere. Consequently, high levels of ozone tend to exist only while high ROG and NO_X levels are present to sustain the ozone formation process. Once the precursors have been depleted, ozone levels rapidly decline. Because these reactions occur on a regional scale, ozone is a regional pollutant.

Ozone located in the upper atmosphere (stratosphere) acts in a beneficial manner by shielding the earth from harmful ultraviolet radiation that is emitted by the sun. However, ozone located in the lower atmosphere (troposphere) is a major health and environmental concern. Meteorology and terrain play a major role in ozone formation. Generally, low wind speeds or stagnant air coupled with warm temperatures and clear skies provide the optimum conditions for ozone formation. As a result, summer is generally the peak ozone season. Because of the reaction time involved, peak ozone concentrations often occur far downwind of the precursor emissions. In general, ozone concentrations over or near urban and rural areas reflect an interplay of emissions of ozone precursors, transport, meteorology, and atmospheric chemistry.

The adverse health effects associated with exposure to ozone impact primarily the respiratory system. Scientific evidence indicates that ambient levels of ozone affect not only sensitive receptors, such as asthmatics and children, but healthy adults as well. Exposure to ambient levels of ozone ranging from 0.10 to 0.40 parts per million (ppm) for 1 to 2 hours has been found to significantly alter lung functions by increasing respiratory rates and pulmonary resistance, decreasing tidal volumes (the amount of air inhaled and exhaled), and impairing respiratory mechanics. Ambient levels of ozone

above 0.12 ppm are linked to symptomatic responses that include such symptoms as throat dryness, chest tightness, headache, and nausea. In addition to the above adverse health effects, evidence also exists relating ozone exposure to an increase in permeability of respiratory epithelia; such increased permeability leads to an increased response of the respiratory system to challenges and a decrease in the immune system's ability to defend against infection.

Although ozone problem in the SJVAB ranks among the most severe in the State, the ozone precursor emissions of ROG and NO_X have decreased over the past several years because of more stringent motor vehicle standards and cleaner burning fuels. From 1992 to 2012, the maximum peak 8-hour indicator decreased by 6 percent. The number of national 8-hour exceedance days has declined by 32 percent (California Air Resources Board [ARB] 2014).

Carbon Monoxide

CO is a colorless, odorless, and poisonous gas produced by incomplete burning of carbon in fuels, primarily from mobile (transportation) sources. In fact, 86 percent of the nationwide CO emissions are from mobile sources; the other 14 percent consists of CO emissions from wood-burning stoves, incinerators, and industrial sources (U.S. Environmental Protection Agency [EPA] 2013a).

CO enters the bloodstream through the lungs by combining with hemoglobin, which normally supplies oxygen to the cells. However, CO combines with hemoglobin much more readily than oxygen does, resulting in a drastic reduction in the amount of oxygen available to the cells. Adverse health effects associated with exposure to CO concentrations include such symptoms as dizziness, headaches, and fatigue. CO exposure is especially harmful to individuals who suffer from cardiovascular and respiratory diseases (EPA 2014).

The highest concentrations are generally associated with cold, stagnant weather conditions that occur during the winter. In contrast to problems caused by ozone, which tends to be a regional pollutant, CO problems tend to be localized.

Nitrogen Dioxide

NO_2 is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2 (EPA 2014). The combined emissions of NO and NO_2 are referred to as NO_X and reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with ozone, the NO_2 concentration in a particular geographical area may not be representative of the local NO_X emission sources.

Inhalation is the most common route of exposure to NO_2. Because NO_2 has relatively low solubility in water, the principal site of toxicity is in the lower respiratory tract. The severity of the adverse health effects depends primarily on the concentration inhaled rather than the duration of exposure. An individual may experience a variety of acute

symptoms, including coughing, difficulty with breathing, vomiting, headache, and eye irritation during or shortly after exposure. After a period of approximately 4 to 12 hours, an exposed individual may experience chemical pneumonitis or pulmonary edema with breathing abnormalities, cough, cyanosis, chest pain and rapid heartbeat. Severe, symptomatic NO_2 intoxication after acute exposure has been linked on occasion with prolonged respiratory impairment with such symptoms as chronic bronchitis and decreased lung functions (EPA 2014).

Sulfur Dioxide

SO_2 is produced by such stationary sources as coal and oil combustion, steel mills, refineries, and pulp and paper mills. The major adverse health effects associated with SO_2 exposure pertain to the upper respiratory tract. SO_2 is a respiratory irritant with constriction of the bronchioles occurring with inhalation of SO_2 at 5 ppm or more. On contact with the moist, mucous membranes, SO_2 produces sulfurous acid (H_2SO_3), which is a direct irritant. Concentration, rather than duration of the exposure, is an important determinant of respiratory effects. Exposure to high SO_2 concentrations may result in edema of the lungs or glottis and respiratory paralysis.

Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot and smoke from mobile and stationary sources, construction operations, fires and natural windblown dust, and particulate matter formed in the atmosphere by condensation and/or transformation of SO_2 and ROG (EPA 2014). $PM_{2.5}$ is a subgroup of PM_{10}, consisting of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less.

PM_{10} emissions in the SJVAB are dominated by emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, waste burning, and residential fuel combustion. The adverse health effects associated with PM_{10} depend on the specific composition of the particulate matter. For example, health effects may be associated with metals, polycyclic aromatic hydrocarbons and other toxic substances adsorbed onto fine particulate matter (referred to as the “piggybacking effect”), or with fine dust particles of silica or asbestos. Generally, adverse health effects associated with PM_{10} may result from both short-term and long-term exposure to elevated concentrations and may include breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, alterations to the immune system, carcinogenesis, and premature death (EPA 2014). $PM_{2.5}$ poses an increased health risk because the particles can deposit deep in the lungs and may contain substances that are particularly harmful to human health.

Direct emissions of $PM_{2.5}$ remained relatively unchanged between 2000 and 2005, was reduced to current levels by 2010, and are projected by the ARB to remain unchanged through 2035 (ARB 2014). Annual average $PM_{2.5}$ concentrations in the SJVAB show a definite downward trend from 1999 through 2011. Annual average concentrations have dropped 26 percent between 1999 and 2011 (ARB 2014). $PM_{2.5}$ emissions in the SJVAB are dominated by emissions from the same area-wide sources as PM_{10}.

Lead

Lead is a metal found naturally in the environment, as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, as discussed in detail below, metal processing is currently the primary source of lead emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities and lead-acid battery manufacturers.

Twenty years ago, mobile sources were the main contributor to ambient lead concentrations in the air. In the early 1970s, the EPA set national regulations to gradually reduce the lead content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. The EPA banned the use of leaded gasoline in highway vehicles in December 1995 (EPA 2014).

As a result of the EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector have declined dramatically (95 percent between 1980 and 1999) and levels of lead in the air decreased by 94 percent between 1980 and 1999. The major sources of lead emissions to the air are ore and metals processing and piston-engine aircraft operating on leaded aviation gasoline (EPA 2014). The National Health and Nutrition Examination Survey have found a steady decrease in the levels of lead in people's blood since 1976. This decline has been attributed to the move from leaded to unleaded gasoline (EPA 2013b).

The decrease in lead emissions and ambient lead concentrations over the past 25 years is California's most dramatic success story with regard to air quality management. The rapid decrease in lead concentrations can be attributed primarily to phasing out the lead in gasoline. This phase-out began during the 1970s, and subsequent ARB regulations have virtually eliminated all lead from gasoline now sold in California. All areas of the State are currently designated as attainment for the State lead standard (the EPA does not designate areas for the national lead standard). Although the ambient lead standards are no longer violated, lead emissions from stationary sources still pose "hot spot" problems in some areas. As a result, the ARB identified lead as a toxic air contaminant.

Emission Sources

With respect to the emissions of criteria air pollutants within Fresno and Madera counties, mobile sources are the largest contributor to the estimated annual average levels of CO and NO_X accounting for approximately 68 percent and 83 percent, respectively, of the total emissions. Area-wide sources account for approximately 22 percent, 90 percent, and 73 percent of ROG, PM_{10} and $PM_{2.5}$ emissions, respectively, in the two counties (Fresno and Madera) (ARB 2013a). Table 4-1 shows the estimated annual average emissions for the SJVAB in 2012.

Table 4-1.
2012 Estimated Annual Average Emissions for the SJVAB (tons per day)

Source Category	TOG	ROG	CO	NO_x	SO_x	PM	PM_{10}	$PM_{2.5}$
Stationary Sources								
Fuel Combustion	18.8	3.6	23.8	29.2	4.3	6.0	5.5	5.3
Waste Disposal	457.4	21.0	0.5	0.3	0.1	0.6	0.2	0.1
Cleaning and Surface Coatings	23.3	20.3	0.0	-	-	0.1	0.1	0.1
Petroleum Production and Marketing	130.9	33.6	0.6	0.3	0.1	0.2	0.2	0.1
Industrial Processes	16.7	15.7	0.8	6.7	3.4	16.5	8.0	3.2
Total Stationary Sources	647.1	94.2	25.7	36.4	7.9	23.4	14.0	8.8
Stationary Sources Percentage of Total	31.6	15.7	1.9	11.1	63.7	4.1	4.3	8.0
Area-wide Sources								
Solvent Evaporation	53.1	47.6	-	-	-	-	-	-
Miscellaneous Processes	969.0	128.6	186.8	13.2	1.3	488.4	250.2	54.0
Total Area-wide Sources	1022.1	176.2	186.8	13.2	1.3	488.4	250.2	54.0
Area-wide Sources Percentage of Total	50.0	29.4	13.9	4.0	10.5	85.6	77.7	49.1
Mobile Sources								
On-road Motor Vehicles	53.2	48.5	437.6	177.9	0.7	10.8	10.8	6.7
Other Mobile Sources	41.6	39.0	252.5	97.6	0.5	5.9	6.6	6.1
Total Mobile Sources	94.8	87.5	690.1	275.5	1.2	16.7	17.4	12.8
Mobile Sources Percentage of Total	4.6	14.6	51.3	84.3	9.7	2.9	5.4	11.6
Natural (Non-anthropogenic) Sources								
Natural Sources	282.0	242.0	442.7	1.7	2.0	42.2	40.5	34.3
Total Natural (Non-anthropogenic Sources)	282.0	242.0	442.7	1.7	2.0	42.2	40.5	34.3
Natural Sources Percentage of Total	13.8	40.3	32.9	0.5	16.1	7.4	12.6	31.2
Grand Total	2046.1	599.9	1345.2	326.8	12.4	570.6	322.1	110.0

Source: ARB 2013a

Key:

CO = carbon monoxide

NOx = nitrogen oxides

PM = particulate matter

PM_{10} = particulate matter smaller than or equal to 10 microns in diameter

$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter

ROG = reactive organic gas

SO_x = sulfur oxides

SJVAB = San Joaquin Valley Air Basin

TOG = total organic gas

Similar to most agricultural areas of the Central Valley, the Project area and vicinity have existing air quality emissions of PM, NO_X, and ROG due, in part, to active agricultural land use. Agricultural field operations, such as tilling, planting, weeding, fertilizing, harvesting, and spreading of manure or compost can produce air pollution emissions. These emissions can be directly emitted from the action of wheels and machinery on soil

or from engine operation and fuel combustion. For example, wind erosion can transport dust after tillage (increasing PM_{10}) and fertilizer used for crops release ammonia to the atmosphere, which mixes with other emissions to form microscopic airborne particles (increasing $PM_{2.5}$).

Monitoring Station Data and Attainment Area Designations

Criteria air pollutant concentrations are measured at several monitoring stations in the SJVAB. There are two stations within proximity to the Project area. The closest is the Pump Yard station, approximately 15 miles east of the project site in Madera County, which measures ozone and NO_X. The next closest is the North Villa Avenue station in the town of Clovis, approximately 30 miles east of the Project area in Fresno County. The North Villa Avenue station measures ozone, CO, PM_{10}, $PM_{2.5}$, and NO_2. These monitoring stations are at elevations similar to the Project site, as they are located on the valley floor. Table 4-2 summarizes the air quality data from these stations for 2008 through 2012. The North Villa Avenue station concentrations are not necessarily representative of Project area concentrations because of the distance from the monitoring station to the site, but give approximate emissions levels that would be similar to the Project vicinity. Figure 4-1 shows the locations of the monitoring stations.

Both the ARB and the EPA use this type of monitoring data in relation to applicable standards to designate area attainment status for criteria air pollutants. The purpose of these designations is to identify those areas with air quality problems and thereby initiate planning efforts for improvement. The basic designation categories are nonattainment, maintenance, attainment, and unclassified. A pollutant is designated nonattainment if there was at least one violation of a Federal or State standard for that pollutant in the area, and a pollutant is designated attainment if the Federal or State standard for that pollutant was not violated at any site in the area during a three-year period. A maintenance area is an area that was previously classified as nonattainment and has subsequently demonstrated compliance with the standards. Unclassified is used in an area that cannot be classified on the basis of available information as meeting or not meeting the standards. In addition, the California designations include a subcategory of the nonattainment designation, called nonattainment-transitional. The nonattainment-transitional designation is given to nonattainment areas that are progressing and nearing attainment. The most current attainment designations for the portion of the SJVAB in the Project area and vicinity are shown in Table 4-3 for each criteria air pollutant.

The SJVAB is designated as being in nonattainment for (see Table 4-3):

- The State 1-hour ozone standard and the Federal and State 8-hour ozone standard.
- The State 24-hour and annual PM_{10} standards.
- The State annual $PM_{2.5}$ standard and the Federal 24-hour and annual $PM_{2.5}$ standards.

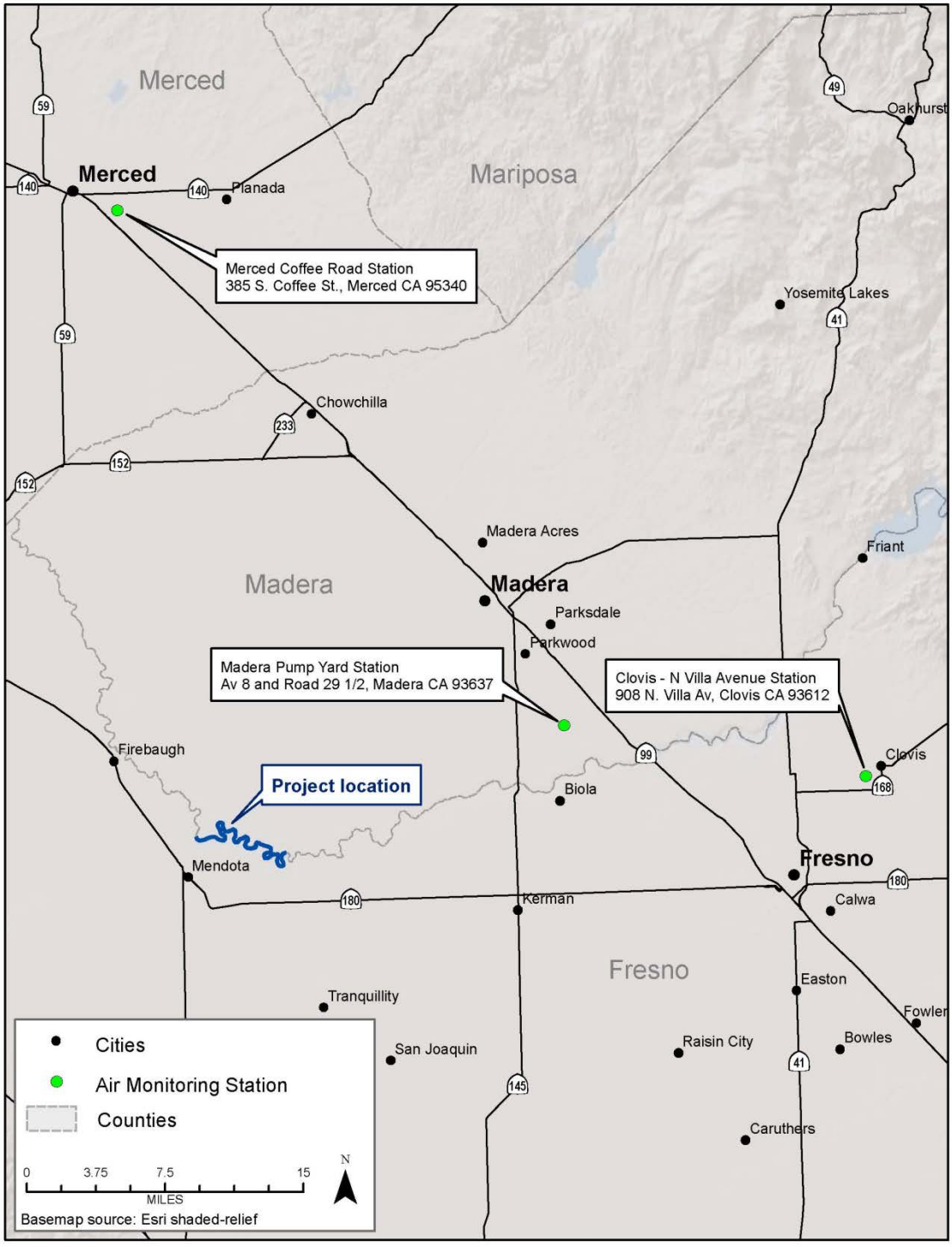

Figure 4-1. Location of Ambient Air Quality Monitoring Stations

Table 4-2.
Summary of Annual Ambient Air Quality Data (2008–2012)

	2008		2009		2010		2011		2012	
	Madera[1]	Fresno[2]	Madera[1]	Fresno[2]	Madera[1]	Fresno[2]	Madera[1]	Fresno[2]	Madera[1]	Fresno[2]
Ozone										
Maximum concentration (1-hr, ppm)	0.120	0.157	0.111	0.121	0.110	0.139	0.098	0.134	0.107	0.135
Maximum concentration (8-hr, ppm)	0.107	0.128	0.096	0.105	0.096	0.106	0.085	0.103	0.092	0.109
Number of days State standard exceeded (1-hr)	9	52	6	42	3	27	2	42	1	46
Number of days State standard exceeded (8-hr)	46	60	27	64	12	58	19	72	21	93
Number of days national standard exceeded (8-hr)	24	44	13	48	8	39	8	49	7	57
Nitrogen Dioxide (NO2)										
Maximum concentration (1-hr, ppm)	0.053	0.067	0.046	0.061	0.048	0.055	0.043	0.050	0.048	0.055
Number of days State standard exceeded (1-hr)	0	0	0	0	0	0	0	0	0	0
Annual Average (ppm)	0.009	0.012	0.009	0.011	0.008	0.010	0.008	0.010	0.008	0.010
Fine Particulate Matter ($PM_{2.5}$)										
Maximum daily concentration ($\mu g/m^3$) National/(California)[3]	-	(95.3)	-	71.0	-	75.2	-	76.4	-	80.8
Number of days national standard exceeded (measured[4])	-	17	-	26	-	19	-	38	-	24
National annual average ($\mu g/m^3$)	-	16.1	-	18.2	-	14.6	-	17.9	-	15.3
Respirable Particulate Matter (PM_{10})										
Maximum concentration ($\mu g/m^3$), National/(California)[3]	-	80.5	-	(65.2)	-	62.8	-	(77.0)	-	(78.3)

Table 4-2.
Summary of Annual Ambient Air Quality Data (2008–2012)

	2008		2009		2010		2011		2012	
	Madera[1]	Fresno[2]	Madera[1]	Fresno[2]	Madera[1]	Fresno[2]	Madera[1]	Fresno[2]	Madera[1]	Fresno[2]
Number of days national standard exceeded (Measured/Calculated[4])	-	0/0	-	0/0	-	0/0	-	0/0	-	0/0
Number of days State standard exceeded (Measured[4])	-	13	-	5	-	8	-	9	-	9
Carbon Monoxide (CO)										
Maximum concentration (1-hr/8-hr [National (California[3])] , ppm)[5]	-	2.8/2.1	-	2.9/2.0	-	2.9/2.0	-	3/2.2	-	3.2/2.1
Number of days State standard exceeded (8-hr)	-	0	-	0	-	0	-	0	-	0
Number of days national standard exceeded (1-hr/8-hr)	-	0/0	-	0/0	-	0/0	-	0/0	-	0/0

Sources: ARB 2013b, EPA 2013c.

Notes:

[1] Measurements from the Pump Yard station (Madera County).

[2] Measurements from the North Villa Avenue station in the town of Clovis (Fresno County).

[3] State and national statistics may differ for the following reasons: State statistics are based on California approved samplers, whereas national statistics are based on samplers using Federal reference or equivalent methods. State and national statistics may therefore be based on different samplers. State statistics are based on local conditions National statistics are based on standard conditions. State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria

[4] Measured days are those days that an actual measurement was greater than the level of the State daily standard or the national daily standard. Measurements are typically collected every 6 days. The number of days above the standard is not necessarily the number of violations of the standard for the year.

[5] National and California 8-hr CO maximum concentrations were the same for these 3 years.

Key:

hr = hour

ppm = parts per million

µg/m^3 = micrograms per cubic meter

- = data not available

Table 4-3.
Summary of Attainment Status Designations and Ambient Air Quality Standards in the Project Area and Vicinity

Pollutant	Averaging Time	California		National Standards[1]		
		Standards [2,3]	Attainment Status [4]	Primary [3,5]	Secondary [3,6]	Attainment Status [7]
Ozone	1-hour	0.09 ppm (180 µg/m^3)	N (Severe)	-	-	-
	8-hour	0.07 ppm (137 µg/m^3)	N	0.075 ppm (147 µg/m^3)	Same as Primary Standard	N (Extreme)
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	A (Fresno) U (Madera, Modesto)	35 ppm (40 mg/m^3)	–	U/A
	8-hour	9 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)	–	0.053 ppm (100 µg/m^3)	Same as Primary Standard	U/A
	1-hour	0.18 ppm (339 µg/m^3)	A	0.10 ppm (188 µg/m^3)	-	–
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	–	0.030 ppm (80 µg/m^3)	–	U/A
	24-hour	0.04 ppm (105 µg/m^3)	A	0.14 ppm (365 µg/m^3)	–	
	3-hour	–	–	–	0.5 ppm (1300 µg/m^3)	
	1-hour	0.25 ppm (655 µg/m^3)	A	0.075 ppm	–	–
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	–	–	Same as Primary Standard	–
	24-hour	50 µg/m^3	N	150 µg/m^3		A
Fine Particulate Matter ($PM_{2.5}$) [9]	Annual Arithmetic Mean	12 µg/m^3	N	12 µg/m^3	Same as Primary Standard	N (Moderate)
	24-hour	–	–	35 µg/m^3		
Lead[8]	30-day Average	1.5 µg/m^3	A	–	–	–
	Calendar Quarter	–	–	1.5 µg/m^3	Same as Primary Standard	U/A
	Rolling 3 Month Average	–	–	0.15 µg/m^3	Same as Primary Standard	U/A
Sulfates	24-hour	25 µg/m^3	A	No National Standards		
Hydrogen Sulfide	1-hour	0.03 ppm (42 µg/m^3)	U	No National Standards		
Vinyl Chloride[8]	24-hour	0.01 ppm (26 µg/m^3)	A	No National Standards		

Table 4-3.
Summary of Attainment Status Designations and Ambient Air Quality Standards in the Project Area and Vicinity

Pollutant	Averaging Time	California		National Standards[1]		
		Standards [2,3]	Attainment Status [4]	Primary [3,5]	Secondary [3,6]	Attainment Status [7]
Visibility-Reducing Particle Matter	8-hour	Extinction coefficient of 0.23 per kilometer —visibility of 10 miles or more (0.07—30 miles or more for Lake Tahoe) because of particles when the relative humidity is less than 70 percent.	U	No National Standards		

Sources: ARB 2011a, 2011b; EPA 2013d; SJVAPCD 2011.

Notes:

[1] National standards (other than ozone, PM, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when 99 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The $PM_{2.5}$ 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current Federal policies.

[2] California standards for ozone, CO (except Lake Tahoe), SO_2 (1- and 24-hour), NO_2, PM, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California Ambient Air Quality Standards (CAAQS) are listed in the Table of Standards in California Code of Regulations, Title 17, section 70200.

[3] Concentration expressed first in units in which it was promulgated [i.e., parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$)]. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Unclassified (U): a pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): a pollutant is designated attainment if the State standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): a pollutant is designated nonattainment if there was a least one violation of a State standard for that pollutant in the area.
Nonattainment/Transitional (NT): is a subcategory of the nonattainment designation. An area is designated nonattainment/transitional to signify that the area is close to attaining the standard for that pollutant.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Nonattainment (N): any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

[8] ARB has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[9.] On December 14, 2012, the EPA revised the annual $PM_{2.5}$ ambient air quality standard. The value was changed from 15 ug/m3 to 12 ug/m3. Attainment designations would not be available until December 2014.

Toxic Air Contaminants

Concentrations of toxic air contaminants, or in Federal parlance hazardous air pollutants (HAPs), are also used as indicators of ambient air quality conditions. A toxic air contaminant is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. Toxic air contaminants are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

According to the *California Almanac of Emissions and Air Quality* (ARB 2007a), the majority of the estimated health risk from toxic air contaminants can be attributed to relatively few compounds, the most important being particulate matter from diesel-fueled engines (diesel particulate matter). Diesel particulate matter differs from other toxic air contaminants in that it is not a single substance, but rather a complex mixture of hundreds of substances. Although diesel particulate matter is emitted by diesel-fueled internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emission control system is present.

Unlike the other toxic air contaminants, no ambient monitoring data are available for diesel particulate matter because no routine measurement method currently exists. However, the ARB has made preliminary concentration estimates based on a particulate matter exposure method. This method uses the ARB emissions inventory's PM_{10} database, ambient PM_{10} monitoring data and the results from several studies to estimate concentrations of diesel particulate matter. In addition to diesel particulate matter, the toxic air contaminants for which data are available that pose the greatest existing ambient risk in California are benzene, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, *para*-dichlorobenzene, formaldehyde, methylene chloride, and perchloroethene.

Diesel particulate matter poses the greatest health risk among these 10 toxic air contaminants. Based on receptor modeling techniques, the ARB estimated the diesel particulate matter health risk within the SJVAB in 2000 to be 390 excess cancer cases per million people. Since 1990, the health risk of diesel particulate matter in the SJVAB has been reduced by 50 percent. Overall, levels of most toxic air contaminants have gone down since 1990 except for *para*-dichlorobenzene and formaldehyde (ARB 2007a).

According to the ARB Community Health Air Pollution Information System, there are five major existing stationary sources of toxic air contaminants within 3 miles of the Project area (ARB 2011c). In addition, vehicles on State Route 140, 165, 99, 41, and 152 are sources of diesel particulate matter and other mobile source air toxics.

Odors

Odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

With respect to odors, the human nose is the sole sensing device. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell very minute quantities of specific substances; others may not have the same sensitivity, but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; an odor that is offensive to one person may be perfectly acceptable to another (e.g., fast food restaurant). An unfamiliar odor is also more likely to be detected and cause complaints than a familiar one. This is due to the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word strong to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

Potential existing sources of odor include various agricultural activities in the vicinity of the Project area (e.g., dairy operations, livestock operations, and fertilizer use).

4.1.2 Sensitive Receptors

Sensitive receptors are considered those with increased exposure or risk to air pollutants and include schools, daycare facilities, elderly care establishments, medical facilities, and other areas that are populated with people considered more vulnerable to the effects of poor air quality. There are some residences located within a 1,000-foot radius of the Project footprint (Figure 4-2). Sensitive receptors shown on Figure 4-2 are single residences or a group of residences. Since this Project mostly consists of construction activities, the receptors would not be exposed to toxic air contaminants or HAPs for a long period of time.

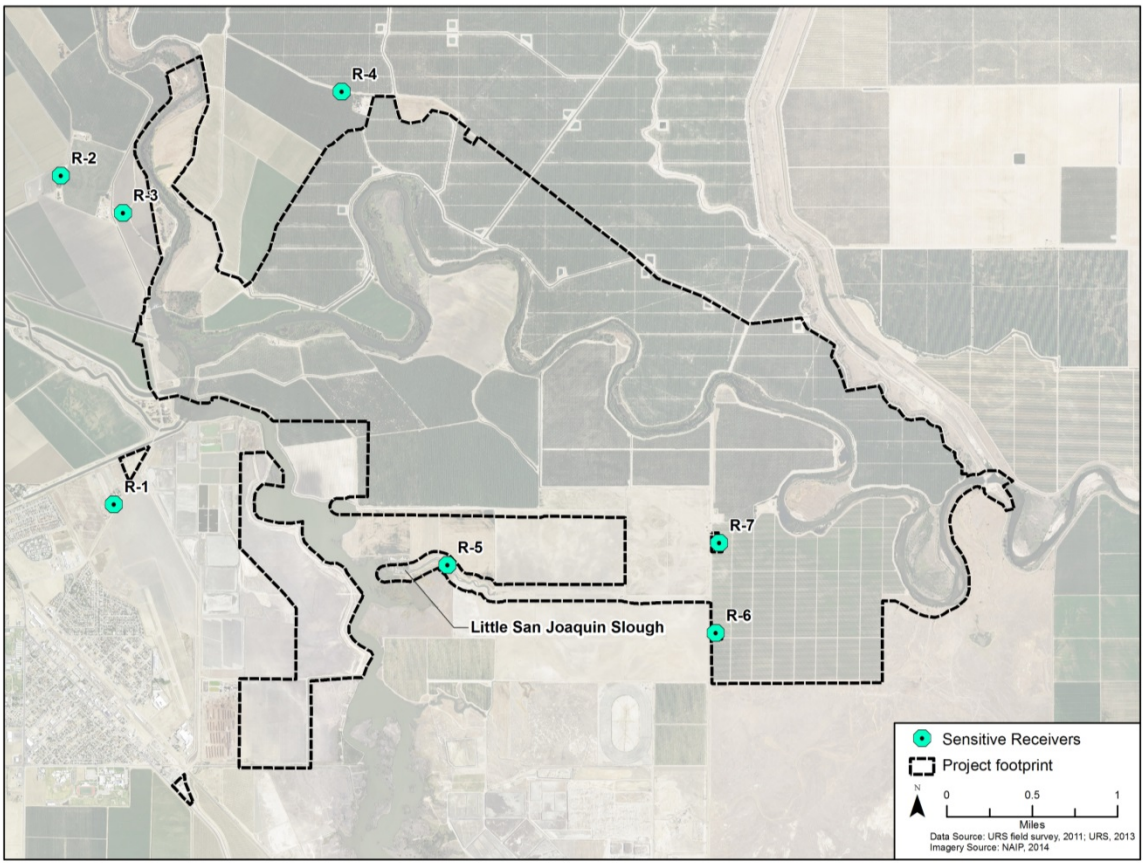

Figure 4-2.
Location of Existing Sensitive Receptors

4.2 Regulatory Setting

Air quality within the Project area and vicinity is regulated by the EPA, the ARB, the SJVAPCD, Fresno and Madera counties, and the cities of Fresno and Firebaugh. Each of these agencies develops rules, regulations, policies, and/or goals to comply with applicable legislation. Although EPA regulations may not be superseded, both State and local regulations may be more stringent.

4.2.1 Federal

Federal laws and regulations pertaining to air quality are discussed below.

Federal Clean Air Act

The Federal Clean Air Act (CAA) was enacted in 1970 to protect and enhance the Nation's air quality to promote public health and welfare and the productive capacity of the Nation's population. The CAA requires an evaluation of any Federal action to determine its potential impact on air quality in the project region. California has a corresponding law, which also must be considered during the preparation of this

Environmental Impact Statement/Report (EIS/R). Most regulatory responsibilities under the CAA are delegated to State, regional, or local government bodies.

The CAA requires areas with unhealthy levels of ozone, CO, NO_2, SO_2, and inhalable particulate matter to develop State Implementation Plans (SIPs) to comply with the national ambient air quality standards (42 United States Code [USC] §7410 et seq.). Federal agencies must conform to SIPs, meaning they must ensure that federally supported activities will not cause or contribute to a new violation, increase the severity of an existing violation, or delay timely attainment of any standard in any area (42 USC §7506(c)(1)(B)).

Proponents of specific projects must demonstrate that the actions will conform to the CAA and the SIP. A Federal action conforms with an applicable SIP if (1) the total of direct and indirect emissions from the action are compliant and consistent with the requirements of the SIP, and (2) one of a list of enumerated, pollutant-specific requirements is satisfied (such as accounting for the Federal action's projected emission of any criteria pollutant in the SIP, or offsetting ozone or NO_2 emissions within the nonattainment area) (42 Code of Federal Regulations [CFR] 93.158(a)). Ultimately, a conformity analysis may require revising a SIP, implementing mitigation measures to bring the Federal action's emissions levels down, or altering the action, possibly by reducing the magnitude of the action, to reduce emissions to levels within the budgets established by the SIP for specific pollutants.

Section 176 of the CAA prohibits Federal agencies from engaging in or supporting an action or activity that does not conform to an applicable SIP. Actions and activities must conform to a SIP's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards, and in attaining those standards expeditiously.

Any Federal agency providing financial assistance, issuing a license or permit, or approving or supporting in any way a proposed project located in a nonattainment or maintenance area for a criteria air pollutant is required to issue a conformity analysis. The conformity analysis must certify that the federally permitted project is consistent with the SIP developed pursuant to the CAA. A conformity analysis is required unless the proposed action's emissions are below the federally established *de minimis* emissions thresholds, and the proposed action's emissions do not reach the level of 10 percent or more of the regional emissions budget for any given pollutant in the nonattainment area. This is also applicable to short-term, construction-related emissions, and therefore applies to the Project.

Criteria Air Pollutants

At the Federal level, the EPA has been charged with implementing national air quality programs. EPA's air quality mandates are drawn primarily from the CAA. The most recent major amendments made by Congress were in 1990.

The CAA required the EPA to establish national ambient air quality standards (NAAQS). As shown in Table 4-3, the EPA has established primary and secondary NAAQS for the

following criteria air pollutants: ozone, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$ and lead. The primary standards protect the public health and the secondary standards protect public welfare. The CAA also required each State to prepare an air quality control plan or SIP. The Federal Clean Air Act Amendments of 1990 (CAAA) added requirements for States with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. The EPA must review all State SIPs to determine whether they conform to the mandates of the CAA and the amendments thereof, and to determine whether implementing them would achieve air quality goals. If the EPA determines a SIP to be inadequate, a Federal Implementation Plan that imposes additional control measures may be prepared for the nonattainment area. Failure to submit an approvable SIP or to implement the plan within the mandated time frame may cause sanctions to be applied to transportation funding and stationary air pollution sources in the air basin.

Toxic Air Contaminants

The EPA has programs for identifying and regulating toxic air contaminants (HAPs in the Federal parlance). Title III of the CAAA directed the EPA to promulgate national emissions standards for HAPs. The standards may differ for major sources than for area sources of HAPs. Major sources are defined as stationary sources with potential to emit more than 10 tons per year of any HAP or more than 25 tons per year of any combination of HAPs; all other sources are considered area sources. The CAAA called on the EPA to promulgate emissions standards in two phases. In the first phase (1992–2000), the EPA developed technology-based emission standards designed to produce the maximum emission reduction achievable. These standards are generally referred to as requiring Maximum Achievable Control Technology. For area sources, the standards may be different based on generally available control technology. In the second phase (2001–2008), the EPA was required to promulgate health risk–based emissions standards where deemed necessary to address risks remaining after implementation of the technology-based national emissions standards for HAPs.

The CAAA also required the EPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions including benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1,3-butadiene. In addition, Section 219 of the CAAA required the use of reformulated gasoline in selected areas with the most severe ozone nonattainment conditions to further reduce mobile-source emissions.

Odors

There are no Federal laws, regulations, or policies pertaining to odors.

General Conformity

To determine whether projects are subject to the general conformity determination requirements, the EPA has established general conformity threshold values (in tons per calendar year) for each of the criteria pollutants for each type of federally designated nonattainment and maintenance areas. If the emissions generated by construction or operation of a project (on an area-wide basis) are less than these threshold values, the

General Conformity Rule is not applicable and no additional analyses are required. If the emissions are greater than these values, compliance with the General Conformity Rule must be demonstrated.

General conformity requirements apply only to federally designated maintenance and nonattainment areas. The Project area is in an area federally designated as an extreme nonattainment area for the 8-hour ozone standard, a nonattainment area for $PM_{2.5}$, and a maintenance area for PM_{10}. The applicability threshold values for this area, according to 40 CFR Part 93, are 10 tons per year for volatile organic compounds, 10 tons per year for NO_X, and 100 tons per year for $PM_{2.5}$ and PM_{10}.

As such, the Project must demonstrate compliance with the General Conformity Rule before construction begins. Compliance with the General Conformity Rule can be demonstrated in one or more of the following ways:

- By reducing construction-phase emissions to below the general conformity *de minimis* thresholds.
- By showing that the construction-phase emissions are included in the area's emission budget for the SIP.
- By demonstrating that the State agrees to include the emission increases in the area's SIP without exceeding emission budgets.
- By offsetting the Project's construction-phase emissions in each year that the thresholds are exceeded.
- Through an air quality modeling analysis demonstrating that the Project would not cause or exacerbate a NAAQS violation (however, this cannot be used for ozone precursors in ozone nonattainment areas).

4.2.2 State of California

State laws and regulations pertaining to air quality are discussed below.

California Clean Air Act

The California Clean Air Act (CCAA) of 1988 requires nonattainment areas, such as the SJVAB, to achieve and maintain State ambient air quality standards by the earliest practicable date. The CCAA also requires local air districts to develop plans for attaining State ozone, CO, NO_2, and SO_2 standards. The SJVAPCD has the authority to issue permits and ensure compliance with air quality regulations in the Project area.

The SJVAPCD is required by the CCAA to develop "indirect source" control programs in its attainment plans. The SJVAPCD is committed to reducing PM_{10} and nitrous oxides (N_2O) emissions from indirect sources in the 2003 PM_{10} Plan and the 2004 Extreme Ozone Attainment Demonstration Plan. The SJVAPCD's Governing Board adopted District Rule 9510 as a result of this commitment. In accordance with SJVAPCD Rule 9510, Indirect Source Review, applicants must mitigate project impacts through the incorporation of on-site emission reducing design elements and/or the payment of fees that would be used to fund off-site emissions reduction projects.

In accordance with SJVAPCD Rule 8021 – Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities, the owner or operator of a construction project is required to submit a Dust Control Plan to the SJVAPCD if at any time the project would involve:

- Residential developments of 10 or more acres of disturbed surface area.
- Nonresidential developments of 5 or more acres of disturbed surface area.
- Moving, depositing, or relocating of more than 2,500 cubic yards per day of bulk materials on at least three days of the project.

A Dust Control Plan identifies the fugitive dust sources at the construction site and describes all of the dust control measures to be implemented before, during, and after any dust-generating activity for the duration of the project. The owner or operator is required to comply with all requirements of the applicable rules under Regulation VIII and the SJVAPCD's Rules and Regulations at all times.

Criteria Air Pollutants

The ARB is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementing the CCAA. The CCAA, which was adopted in 1988, required the ARB to establish California ambient air quality standards (CAAQS) (Table 4-3). The ARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the above-mentioned criteria air pollutants. In most cases the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard-setting process and the interpretation of the studies. In addition, the CAAQS incorporate a margin of safety to protect sensitive individuals.

The CCAA requires that all local air districts in the State endeavor to achieve and maintain the CAAQS by the earliest practical date. The act specifies that local air districts should focus particular attention on reducing the emissions from transportation and area-wide emission sources, and provides districts with the authority to regulate indirect sources.

Among the ARB's other responsibilities are overseeing local air district compliance with California and Federal laws, approving local air quality plans, submitting SIPs to the EPA, monitoring air quality, determining and updating area designations and maps, and setting emissions standards for new mobile sources, consumer products, small utility engines, off-road vehicles, and fuels. In California, there are 15 nonattainment areas for the national ozone standard and two nonattainment areas for the $PM_{2.5}$ standard (EPA 2013d). The ozone SIP and $PM_{2.5}$ SIP were adopted and sent to the EPA on 2007 and 2012, respectively. The SIP must show how each area would attain the Federal standards. To do this, the SIP identifies the amount of pollution emissions that must be reduced in each area to meet the standard and the emission controls needed to reduce the necessary emissions.

Toxic Air Contaminants

Toxic air contaminants in California are primarily regulated through the Tanner Air Toxics Act (Assembly Bill [AB] 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588). AB 1807 sets forth a formal procedure for the ARB to designate substances as toxic air contaminants. Research, public participation, and scientific peer review must occur before the ARB can designate a substance as a toxic air contaminant. To date, the ARB has identified more than 21 toxic air contaminants and adopted the EPA's list of HAPs as toxic air contaminants. Most recently, diesel particulate matter was added to the ARB list of toxic air contaminants.

Once a toxic air contaminant is identified, the ARB then adopts an Airborne Toxics Control Measure for sources that emit that particular toxic air contaminant. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate best available control technology (BACT) to minimize emissions (e.g., the airborne toxics control measure limits truck idling to 5 minutes [Cal. Code Regs., tit. 13, Ch. 10, § 2485]).

The Hot Spots Act requires that existing facilities that emit toxic substances above a specified level prepare a toxic-emission inventory, prepare a risk assessment if emissions are significant, notify the public of significant risk levels, and prepare and implement risk reduction measures.

The ARB has adopted diesel-exhaust control measures and more stringent emission standards for various on-road mobile sources of emissions, including transit buses and off-road diesel equipment (e.g., tractors, generators). In February 2000, the ARB adopted a new public-transit bus fleet rule and emission standards for new urban buses. These new rules and standards provide for (1) more stringent emission standards for some new urban bus engines, beginning with 2002 model year engines; (2) zero-emission bus demonstration and purchase requirements applicable to transit agencies; and (3) reporting requirements, under which transit agencies must demonstrate compliance with the public-transit bus fleet rule. Current milestones include the low-sulfur diesel fuel requirement and tighter emission standards for heavy-duty diesel trucks (2007) and off-road diesel equipment (2011) nationwide. Over time, the replacement of older vehicles would result in a vehicle fleet that produces substantially lower levels of toxic air contaminants than under current conditions. Mobile-source emissions of toxic air contaminants (e.g., benzene, 1,3-butadiene, diesel particulate matter) have been reduced significantly over the last decade, and would be reduced further in California through a progression of regulatory measures (e.g., Low Emission Vehicle/Clean Fuels and Phase II reformulated gasoline regulations) and control technologies. With implementation of ARB's Risk Reduction Plan, it is expected that diesel particulate matter concentrations would be reduced by 85 percent in 2020 from the estimated year-2000 level. Adopted regulations are also expected to continue to reduce formaldehyde emissions from cars and light-duty trucks. As emissions are reduced, it is expected that risks associated with exposure to the emissions would also be reduced.

The ARB (2005) published the *Air Quality and Land Use Handbook: A Community Health Perspective,* which provides guidance concerning land use compatibility with toxic air contaminant sources. While not a law or adopted policy, the handbook offers advisory recommendations for the siting of sensitive receptors near uses associated with toxic air contaminants, such as freeways and high-traffic roads, commercial distribution centers, rail yards, ports, refineries dry cleaners, gasoline stations, and industrial facilities.

Odors

There are no State laws, regulations, or policies pertaining to odors.

4.2.3 Regional and Local

Regional and local plans and policies pertaining to air quality are discussed below. The Project area is located within the SJVAB which is regulated by the SJVAPCD.

Criteria Air Pollutants

San Joaquin Valley Air Pollution Control District Regulations

The SJVAPCD seeks to improve air quality conditions in the SJVAB through a comprehensive program of planning, regulation, enforcement, technical innovation and promotion of the understanding of air quality issues. The clean air strategy of the SJVAPCD includes preparing plans and programs for the attainment of ambient air quality standards (AAQS), adopting and enforcing rules and regulations, and issuing permits for stationary sources. The SJVAPCD also inspects stationary sources, responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements other programs and regulations required by the CAA, CAAA, and CCAA.

Guide for Assessing and Mitigating Air Quality Impacts. In January 2002, the SJVAPCD released a revision to the previously adopted guidelines document. This revised *Guide for Assessing and Mitigating Air Quality Impacts* (GAMAQI) (SJVAPCD 2002) is an advisory document that provides lead agencies, consultants, and project applicants with uniform procedures for addressing air quality in environmental documents. The guide contains the following applicable components:

- Criteria and thresholds for determining whether a project may have a significant adverse air quality impact.
- Specific procedures and modeling protocols for quantifying and analyzing air quality impacts.
- Methods available to mitigate air quality impacts.
- Information for use in air quality assessments that is updated frequently such as air quality data, regulatory setting, climate and topography.

The SJVAPCD prepared an updated Draft GAMAQI in 2012 and a subsequent update to the Draft GAMAQI in July 2014. The Draft 2012 GAMAQI and 2014 GAMAQI contain similar thresholds of significance with additional clarification on criteria mass emissions. They also update and clarify the methodologies and basis for thresholds.

Air Quality Attainment Plans. The SJVAPCD prepares and submits Air Quality Attainment Plans in compliance with the requirements set forth in the CCAA. The CCAA also requires a triennial assessment of the extent of air quality improvements and emission reductions achieved through the use of control measures. As part of the assessment, the attainment plans must be reviewed and, if necessary, revised to correct for deficiencies in progress and to incorporate new data or projections. As a nonattainment area, the region is also required to submit rate-of-progress milestone evaluations in accordance with the CAAA. These milestone reports include compliance demonstrations if requirements are being met in the nonattainment area. The air quality attainment plans and reports present comprehensive strategies to reduce emissions of ROG, NO_X, and $PM_{10}/PM_{2.5}$ from stationary, area, mobile and indirect sources. Such strategies include the adoption of rules and regulations; enhancement of California Environmental Quality Act (CEQA) participation; implementation of a new and modified indirect-source review program; adoption of local air quality plans; and stationary-, mobile-, and indirect-source control measures. Table 4-4 summarizes the SJVAPCD's current Air Quality Attainment Plans.

Rules and Regulations. As mentioned above, the SJVAPCD adopts rules and regulations. All projects are subject to the SJVAPCD's rules and regulations in effect at the time of construction. Specific rules applicable to the construction of the Project may include, but are not limited to:

Regulation VIII—Fugitive Dust PM_{10} Prohibitions: Rules 8011 to 8081 are designed to reduce PM_{10} emissions (predominantly dust/dirt) generated by human activity, including construction and demolition activities, road construction, bulk materials storage, paved and unpaved roads, carryout and track out, and landfill operations. Compliance with Regulation VIII is mandatory. If a nonresidential project is 5 or more acres in area, a Dust Control Plan must be submitted as specified in Section 6.3.1 of Rule 8021 and construction activities are not allowed to commence until the SJVAPCD has approved the plan.

Rule 2010—Permits Required: This rule applies to any person who plans to or does operate, construct, alter, or replace any source operation which may emit air contaminants or may reduce the emission of air contaminants. This Project, or portions thereof, may be subject to SJVAPCD permitting requirements.

Rule 2201—New and Modified Stationary Source Review Rule: This rule applies to all new stationary sources and all modifications of existing stationary sources. They are subject to SJVAPCD permit requirements if, after construction, they emit or may emit one or more affected pollutant.

Rule 3135—Dust Control Plan Fee: This rule requires the applicant to submit a fee in addition to a Dust Control Plan. The purpose of this fee is to recover the SJVAPCD's cost for reviewing such plans and conducting compliance inspections.

Table 4-4.
Summary of San Joaquin Valley Air Pollution Control District Air Quality Plans

Pollutant	Plan Title	Date	Status
Ozone	*Extreme Ozone Attainment Demonstration Plan, San Joaquin Valley Air Basin Plan Demonstrating Attainment of Federal 1-Hour Ozone Standards*	October 2004, Amended October 2005	Adopted by SJVAPCD and ARB in October 2004. Submitted to EPA in November 2004.[1]
	2013 Plan for the Revoked 1-Hour Ozone Standard	September 2013	Adopted by SJVAPCD on September 19, 2013.
	Draft Staff Report, 8-Hour Ozone Reasonably Available Control Technology—State Implementation Plan Analysis	April 2006	Adopted by SJVAPCD in August 17, 2006.
	8-Hour Ozone Attainment Demonstration Plan for the San Joaquin Valley	April 2007	Adopted by SJVAPCD in April 2007. Approved by ARB in June 2007. EPA approved the SJVAPCD 8-hour plan (revised in 2008 and 2011) on March 1, 2012
Carbon Monoxide (CO)	*2004 Revision to the California State Implementation Plan for Carbon Monoxide Updated Maintenance Plan for the Federal Planning Areas*	July 2004	Adopted by ARB July 2004. Approved by EPA on November 30, 2005
Respirable and Fine Particulate Matter (PM_{10} and $PM_{2.5}$)	*$PM_{2.5}$ Plan*	December 2012	Adopted by SJVAPCD in December 2012. Adopted by ARB January 2013 and submitted to the EPA.
	Natural Events Action Plan for High Wind Events in the San Joaquin Valley	August 2008	Adopted by SJVAPCD August 2008. Final Version submitted to ARB and EPA on August 7, 2008.

Sources: ARB 2008, 2011d; SJVAPCD 2005, 2011, 2013.

Notes:

[1] Effective June 15, 2005, EPA revoked in full the national 1-hour ozone ambient air quality standard, including associated designations and classifications.

Key:

ARB = California Air Resources Board

EPA = U.S. Environmental Protection Agency

SJVAPCD = San Joaquin Valley Air Pollution Control District

Rule 4101—Visible Emissions: This rule prohibits emissions of visible air contaminants to the atmosphere and applies to any source operation that emits or may emit air contaminants.

Rule 4102—Nuisance: This rule applies to any source operation that emits or may emit air contaminants or other materials. In the event that such emissions create a public nuisance, the owner/operator could be in violation and be subject to SJVAPCD enforcement action.

Rule 4601—Architectural Coatings: This rule limits volatile organic compounds from architectural coatings by specifying architectural coatings storage, clean up, and labeling requirements.

Rule 4641—Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations: This rule applies to the manufacture and use of the aforementioned asphalt types for paving and maintenance operations.

Rule 9510—Indirect Source Review: This rule was adopted to reduce the impacts of growth in emissions from all new development in the SJVAB. The purposes of Rule 9510 are to (1) fulfill the SJVAPCD's emission reduction commitments in the PM_{10} and Ozone Attainment Plans; (2) achieve emission reductions from the construction and use of development projects through design features and on-site measures; and (3) provide a mechanism for reducing emissions from the construction of and use of development projects through off-site measures.

The rule is applicable to any person or entity that undertakes a development project, which upon full build out is 2,000 square feet or more of retail/commercial uses, or 9,000 square feet or more of space not identified in Rule 9510, or any transportation or transit project where construction exhaust emissions equal or exceed 2 tons of NO_X or 2 tons of PM_{10}. As such, this rule is applicable to the San Joaquin River Restoration Program (SJRRP) because projects implemented under the SJRRP meet these criteria. Compliance with Rule 9510 would be required.

Fresno County General Plan

Section G, Air Quality, of the Open Space and Conservation Element of the Fresno County General Plan states that the County would support and implement SJVAPCD programs in maintaining air quality within the County and that the County would consider all air quality implications for new discretionary land use development and transportation infrastructure improvements (Policies OS-G.1 through OS-G.16) (Fresno County 2000).

Madera County General Plan

In 2010 Madera County adopted an Air Quality Element to its General Plan. The Air Quality Element states that the County would support and implement SJVAPCD programs in maintaining air quality within the County and that the County would integrate air quality planning into the transportation planning process (Madera County 2010).

City of Fresno General Plan

Section G-1, Air Quality, of the Resource Conservation Element includes the objective to, in cooperation with other jurisdictions and agencies in the SJVAB, take necessary actions to achieve and maintain compliance with State and national air quality standards (City of Fresno 2009).

City of Firebaugh

The city of Firebaugh does not currently have a general plan or any air quality regulations in its municipal code.

City of Mendota

The city of Mendota General Plan Update 2002-2005 states that the City would support and implement SJVAPCD programs in maintaining air quality within the City and that the City would integrate air quality planning into the transportation planning process. Policies are in support of land use designs to encourage infill and density to support pedestrian circulation which would decrease use of mobile sources. Policies are in support of energy efficient to reduce energy consumption. Policies are in support of construction equipment control devices when operating near sensitive receptors to control the diesel exhaust particulate matter (City of Mendota 2009).

Toxic Air Contaminants

At the local level, air pollution control or management districts may adopt and enforce ARB control measures. Under SJVAPCD Regulations II and VII, all sources that possess the potential to emit toxic air contaminants are required to obtain permits from the district. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including new-source review standards and air toxics control measures. The SJVAPCD limits emissions and public exposure to toxic air contaminants through a number of programs. The SJVAPCD prioritizes toxic air contaminant-emitting stationary sources based on the quantity and toxicity of the toxic air contaminant emissions and the proximity of the facilities to sensitive receptors.

Projects that require a permit are analyzed by the SJVAPCD (e.g., health risk assessment) on the basis of their potential to emit toxics. If it is determined that the project would emit toxics in excess of the SJVAPCD's threshold of significance for toxic air contaminants, as identified below, projects must implement the best available control technology for toxic air contaminants (T-BACT) to reduce emissions. If a project cannot reduce the risk below the threshold of significance, even after T-BACT has been implemented, the SJVAPCD would deny the permit required by the project. This helps to prevent new problems and reduces emissions from existing older sources by requiring them to apply new technology when retrofitting with respect to toxic air contaminants. It is important to note that the SJVAPCD's air quality permitting process applies to stationary sources; properties that are exposed to elevated levels of non-stationary type sources of toxic air contaminants, and the non-stationary type sources themselves (e.g., on-road vehicles), are not subject to air quality permits. Further, for reasons of feasibility and practicality, mobile sources (e.g., cars, trucks) are not required to implement T-BACT, even if they do have the potential to expose adjacent properties to elevated levels of toxic air contaminants. Rather, emissions controls on such sources (e.g., vehicles) are subject to regulations implemented on the Federal and State levels.

Odors

The SJVAPCD has determined some common types of facilities that have been known to produce odors, including wastewater treatment facilities, chemical manufacturing plants, painting/coating operations, feed lots/dairies, composting facilities, landfills and transfer stations. Any actions related to odors are based on citizen complaints to local governments and the SJVAPCD. According to the SJVAPCD, significant odor problems occur when there is more than one confirmed complaint per year averaged over a three-

year period or when there are three unconfirmed complaints per year averaged over a three-year period (SJVAPCD 2002).

Two situations increase the potential for odor problems. The first occurs when a new odor source is located near existing sensitive receptors. The second occurs when new sensitive receptors are developed near existing sources of odor. In the first situation, the SJVAPCD recommends operational changes, add-on controls, process changes or buffer zones where feasible to address odor complaints. In the second situation, the potential conflict is considered significant if the project site is at least as close as any other site that has already experienced significant odor problems related to the odor source. For projects locating near a source of odors where there is no nearby development that may have filed complaints, and for odor sources locating near existing sensitive receptors, the SJVAPCD requires the determination of potential conflict to be based on the distance and frequency at which odor complaints from the public have occurred in the vicinity of a similar facility (SJVAPCD 2002). The SJVAPCD has adopted Rule 4102, as identified above, that applies to odor emissions.

4.3 Environmental Consequences and Mitigation Measures

4.3.1 Impact Assessment Methodology

This section addresses the potential for impacts to air quality and human health.

Construction activities associated with the Project would generate criteria air pollutant emissions: CO, SO_2, particulate matter (PM_{10} and $PM_{2.5}$); and ozone precursors (ROGs and NO_x). Construction of the Project would generate toxic air contaminant emissions: diesel particulate matter and gasoline related toxic air contaminants.

The following approach was used to estimate criteria pollutant emissions. Exhaust emissions from off-road construction equipment were estimated using the Roadway Construction Emissions Model (RoadMod) and In-Use Off-road Equipment 2011 Inventory Model[1] (Sacramento Metropolitan Air Quality Management District 2012). On-road mobile source emissions from worker and truck trips was calculated using estimates of vehicle miles traveled and appropriate emission factors from Emission Factors Modeling Software (EMFAC) (ARB 2007b). Fugitive dust from earthmoving activities was quantified using AP-42 emission factors. Fugitive dust emissions from mobile source trips and stockpiling was estimated using AP-42 Chapter 13.2 emission factors.

In addition, potential health risks from toxic air contaminants to nearby sensitive receptors (e.g., local parks, residential areas, and schools) were evaluated based on California Office of Environmental Health Hazard Assessment's (OEHHA's) guidelines (OEHHA 2012). Sensitive receptors are populations that are susceptible to the effects of exposure to air toxics such as children and elderly people. Heavy-duty diesel trucks are a

[1] This replaces OFFROAD2007 for construction and mining equipment.

source of diesel particulate matter, which is classified as a chronic and carcinogenic health risk.

Construction Emission Estimation

The construction emissions were broken down into three categories: off-road equipment exhaust, fugitive dust emissions from construction activities, and on-road mobile source exhaust emissions. Emissions were estimated using emission factors taken from RoadMod which has been updated to incorporate the emission factors from In-Use Off-road Equipment 2011 Inventory Model for the off-road equipment (ARB 2011e). The emission factors for on-road mobile sources are based on EMFAC for the SJVAPCD for calendar year 2014 (ARB 2007b). The fugitive dust emissions from construction equipment and travel on roads are based on AP-42 emission factors. Further details on the specific emission factors used are provided in Appendix 4-A – Tables.

The California Department of Water Resources (DWR) provided construction schedules and equipment lists that were used to determine the number, size, and duration of construction equipment activity.[2] A summary of this information is provided in Appendix 4-A – Tables. Project assumptions include: a constant of 100 workers would be used throughout the Project duration; there would be on average 18 working days per month; workers would travel 35 miles each one-way trip; and material hauling trips would average 135 miles for each one-way trip. The number of material hauling trips and the duration of equipment use varies by alternative based on the type of construction activity, as detailed in Appendix 4-A– Tables. Assumptions were based on information provided by DWR and are consistent with those detailed in the Traffic Analysis in Chapter 22.0.

Fugitive dust occurs from various types of construction activity associated with site preparation, grading, dozing, and loading/unloading material. The EPA's AP-42 emission factors for Western Surface Coal Mining were used to estimate the emissions from fugitive dust from grading, bulldozing, and material loading and unloading (EPA 1998). On-road mobile sources generate fugitive dust when traveling on paved and unpaved roads. These were estimated using the EPA's AP-42 emission factors for Paved and Unpaved Roads (EPA 2006, 2011a). Details of these calculations are in Appendix 4-A – Tables.

Operational Emission Estimation

The operational emissions are associated with vehicle traffic of workers to provide maintenance and operation of the Project. The trips were provided by the DWR and other assumptions detailed in the Traffic Analysis. The workers were assumed to travel 35 miles each one-way trip.

The emission factors for on-road mobile sources are conservatively based on EMFAC for the SJVAPCD for calendar year 2014 (ARB 2007b). The fugitive dust emissions travel on roads is based on AP-42 emission factors. Further details on the specific emission factors used are provided in Appendix 4-A – Tables.

[2] If phase duration was not specified, 18 days was assumed.

Health Risk Assessment

The construction equipment and material hauling vehicles emit diesel particulate matter that is classified as a toxic air contaminant. Gasoline-fueled vehicles emit various toxic air contaminants in much smaller quantities and health toxicity compared to diesel particulate matter. Thus, gasoline fueled emission sources have not been included further in this health risk assessment. The emissions of diesel particulate matter sources are used in the health risk assessment and the details of the emission rates used are contained in Appendix 4-A – Tables.

In order to evaluate the impacts of diesel particulate matter on nearby sensitive receptors, a health risk assessment was conducted consistent with OEHHA (OEHHA 2003, 2012) and SJVAPCD guidelines (SJVAPCD 2006) for determining local community risks and hazards. The health risk assessment evaluated the health risks associated with the Project emissions from construction equipment and material hauling vehicles. The detailed information on the methodology and data used to conduct the health risk assessment since air dispersion modeling was required is summarized in Appendix 4-B – Health Risk Assessment Methodology.

4.3.2 Significance Criteria

The Project was evaluated in accordance with the Air Quality section of Appendix G of the CEQA Environmental Checklist and professional judgment on anticipated impacts on air quality. Under the National Environmental Policy Act (NEPA) Council on Environmental Quality (CEQ) Regulations, effects must be evaluated in terms of their context and intensity. These factors have been considered when applying the CEQA Guidelines Appendix G. The Project would result in a significant impact on air quality if it would do any of the following:

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable Federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

The regional criteria pollutant emissions were compared to the SJVAPCD significance thresholds to determine CEQA significance and to the General Conformity Rule *de minimis* thresholds to determine NEPA effects. These thresholds are shown in Table 4-5. If emissions exceed the SJVAPCD significance thresholds, the emissions would have to be mitigated in order for the impacts to be considered less than significant. If emissions exceed the General Conformity Rule *de minimis* thresholds, a general conformity analysis would be required. Construction emissions are compared to these significance thresholds

to determine significance impacts. Operational emissions for criteria pollutants are also compared to these significance thresholds.

The health risk analysis used the OEHHA's guidance to estimate the Project's incremental increase in chronic and cancer health risks to nearby sensitive receptors. The OEHHA's guidance provides procedures for determining chronic and cancer risk. It provides guidance on exposure parameters such as breathing rates and provides guidance on how to use the tiered approach to analyze health risk impacts.

The significance threshold for health impacts to sensitive receptors is an incremental increase in cancer risk greater than 10 in a million or an chronic hazard index greater than 1 (SJVAPCD 2002, 2012, 2014).

Table 4-5.
SJVAPCD CEQA and General Conformity Rule *de minimis* Thresholds of Significance

Pollutant	SJVAPCD CEQA Thresholds (tpy)	GCR *de minimis* thresholds (tpy)
Ozone precursor (NO_x)	10	10
Ozone precursor (ROGs)	10	10
Carbon monoxide (CO)	100	N/A
Sulfur oxides (SO_x)	27	N/A
Fine Particulate Matter ($PM_{2.5}$)	15	100
$PM_{2.5}$ precursor (SO_2)	N/A	100
Respirable Particulate Matter (PM_{10})	15	100

Source: EPA 2011b, SJVAPCD 2002, 2012, 2014.
Key:
CEQA = California Environmental Quality Act
GCR = General Conformity Rule
SJVAPCD = San Joaquin Valley Air Pollution Control District
tpy = tons per year

4.3.3 Impacts and Mitigation Measures

This section provides a Project-level evaluation of direct and indirect effects of the Project alternatives on air quality. It includes analyses of potential effects relative to No-Action conditions in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. The analysis is organized by Project alternative with specific impact topics numbered sequentially under each alternative. With respect to air quality, the environmental impact issues and concerns are the potential to:

1. Create Excess Amounts of Construction Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS.
2. Conflict with Applicable Plans or Policies Related to Air Quality.

3. Expose Sensitive Receptors to Substantial Air Pollutants Associated with Construction.
4. Create Excess Amounts of Operational Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS.
5. Expose Sensitive Receptors to Substantial Air Pollutants Associated with Operation.
6. Create Objectionable Odors from Construction.
7. Create Objectionable Odors from Operation.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the SJRRP would be implemented, including habitat restoration, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these Program-level activities would not achieve Settlement goals. This section describes the impacts of the No-Action Alternative. The analysis is a comparison to existing conditions, and no mitigation is required for No-Action.

Impact AQ-1 (No-Action Alternative*): Create Excess Amounts of Construction Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS*. Under the No-Action Alternative, the Project would not be implemented and there would be no associated construction activities in the Project area. Therefore, there would be no Project-related construction related criteria air pollutants. As a result, there would be **no impact** on air quality from Project-related construction emissions.

Impact AQ-2 (No-Action Alternative): *Conflict with Applicable Plans or Policies Related to Air Quality*. Under the No-Action Alternative, the Project would not be implemented and there would be no associated construction activities in the Project area. In addition, there would be no change in any sources of operational related emissions in the Project area. This includes any emissions associated with vehicles traveling to the Project area for operation and maintenance of the existing facilities located in the Project area. The SJVAPCD has several plans and policies relating to air emissions in the SJVAB. These specifically address ozone, PM_{10} and $PM_{2.5}$ as these are designated as non-attainment under the State and national AAQS. The No-Action Alternative would not generate any new sources of emissions for construction or operation nor does the existing setting have any significant sources of emissions that would be targeted for reduction by the plans and policies. Therefore, there would be no conflicts with applicable plans or policies related to air quality and this would have **no impact**.

Impact AQ-3 (No-Action Alternative): *Expose Sensitive Receptors to Substantial Air Pollutants Associated with Construction*. Under the No-Action Alternative, the Project would not be implemented and there would be no associated construction activities in the

Project area. Therefore, there would be no construction related toxic air contaminants. As a result, there would be **no impact** on sensitive receptors due to toxic air contaminants.

Impact AQ-4 (No-Action Alternative): ***Create Excess Amounts of Operational Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS***. Under the No-Action Alternative, the Project would not be implemented and there would be no Project-related operational activities in the Project area. Therefore, there would be no operational related criteria air pollutants. As a result, there would be **no impact** on air quality from operational emissions.

Impact AQ-5 (No-Action Alternative): ***Expose Sensitive Receptors to Substantial Air Pollutants Associated with Operation***. Under the No-Action Alternative, the Project would not be implemented and there would be no Project-related operational activities in the Project area. Therefore, there would be no operational related toxic air contaminants. As a result, there would be **no impact** on sensitive receptors due to toxic air contaminants.

Impact AQ-6 (No-Action Alternative): ***Create Objectionable Odors from Construction.*** Under the No-Action Alternative, the Project would not be implemented and there would be no construction activities in the Project area. Therefore, there would be no construction related odors. As a result, there would be **no impact** from odors.

Impact AQ-7 (No-Action Alternative): ***Create Objectionable Odors from Operation*****.** Under the No-Action Alternative, the Project would not be implemented and there would be no Project-related operational activities in the Project area. Therefore, there would be no operational related odors. There are no existing sources of odors in the Project area. As a result; there would be **no impact** from odors.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would include construction of Project facilities including a Compact Bypass channel, a new levee system with a narrow floodplain encompassing the river channel, and the South Canal. Other key features include construction of the Mendota Pool Dike (separating the San Joaquin River and Mendota Pool), a fish barrier below Mendota Dam, and the South Canal bifurcation structure and fish passage facility, modification of the San Mateo Avenue crossing, and the removal of the San Joaquin River control structure of the Chowchilla Bifurcation Structure. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Impact AQ-1 (Alternative A)*: Create Excess Amounts of Construction Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS*. Compared to No-Action, Alternative A would implement the Project and there would be short-term construction activities in the Project area. Construction emissions were estimated for the off-road construction equipment, material hauling vehicles, worker commute vehicles, and fugitive dust emissions from construction and travel on roads (Table 4-6). The construction emissions represent the worst-case scenario where none of the borrow materials would be sourced locally and

materials would be hauled from more than 100 miles away. These construction emissions were compared to the General Conformity Rule *de minimis* thresholds for NEPA. The General Conformity Rule *de minimis* threshold would be exceeded for NOx and ROG and therefore construction emissions would be substantial.

Total construction emissions were compared to the SJVAPCD's significance thresholds for CEQA. CO, NOx, ROG, PM_{10}, and $PM_{2.5}$ criteria pollutants are above the SJVAPCD annual emissions thresholds which indicate that the Project could cause a significant impact compared to existing conditions. The CO, PM_{10}, and $PM_{2.5}$ emissions were modeled using air dispersion modeling to determine if the concentration including background was below the AAQS or below a significant impact level in the local area. NOx and ROG emissions were not modeled, as these are ozone precursors and contribute to the regional ozone problem.

The modeled 1-hour CO maximum concentration from Project sources is shown in Table 4-7. This was combined with the background concentration based on the average 1-hour concentration for 2010 to 2013. This indicates that at the point of maximum impact, the CO concentration is less than the AAQS. Therefore, modeling indicates that the Project has a less than significant impact for CO.

When modeled, the PM_{10} and $PM_{2.5}$ maximum concentrations from Project sources are shown in Table 4-8. Since the SJVAB is already in non-attainment for both PM_{10} and $PM_{2.5}$, a concentration above the significant impact level would contribute to exceedances of the AAQS. The significant impact levels are based on the Prevention of Significant Deterioration thresholds set by the SJVAPCD. The Fugitive PM_{10} annual significant impact level is 2.08 $\mu g/m^3$. The EPA vacated the $PM_{2.5}$ and Fugitive $PM_{2.5}$ annual significant impact level in 2013. As there is no adopted $PM_{2.5}$ significant impact level, the SJVAPCD recommends using the corresponding PM_{10} significant impact level for both PM_{10} and $PM_{2.5}$ analyses (Villalvazo, pers. comm., 2014). Therefore, 2.08 $\mu g/m^3$ is used as the Fugitive $PM_{2.5}$ annual significant impact level. As shown in Table 4-8 the PM_{10} and $PM_{2.5}$ Project concentrations are below this significance level. Therefore, after modeling, the construction emissions of PM_{10} and $PM_{2.5}$ are less than significant impacts. The calculated fugitive dust emissions would be further reduced if control measures from compliance with SJVAPCD Regulation VIII were quantified; as such, the fugitive dust emissions stated here are conservative because these control measures would be required through mandatory compliance with SJVAPCD Regulation VIII. Compliance with SJVAPCD Regulation VIII would reduce PM_{10} emissions (predominantly dust/dirt) generated by human activity, including construction and demolition activities, road construction, bulk materials storage, paved and unpaved roads, carryout and track out, and landfill operations.

As discussed above, NOx and ROG are above the SJVAPCD annual emissions thresholds for regional air quality. Therefore, Alternative A would have a **significant** impact for construction-related criteria air pollutants for NOx and ROG.

Table 4-6.
Total Construction Emissions

Alt	Year	CO	NOx	ROG	SOx	PM_{10}	$PM_{2.5}$
		Tons per Year					
A	Year 1	23.55		4.15	0.11	7.38	4.13
	Year 2	72.04			0.32		12.89
	Year 3	69.41			0.32		13.37
	Year 4	56.92		9.90	0.27	12.58	7.80
	Year 5	56.13		9.97	0.26		10.45
	Year 6				0.78		
	Year 7				0.78		
	Year 8				0.78		
	Year 9				0.77		
	Year 10				0.70		
B	Year 1	23.93		4.23	0.11	7.80	4.30
	Year 2	72.58			0.32		14.28
	Year 3	68.04			0.31		12.39
	Year 4	61.92			0.30	13.40	8.41
	Year 5	77.79			0.37		13.19
	Year 6				0.72		
	Year 7				0.72		
	Year 8				0.71		
	Year 9				0.72		
	Year 10				0.53		
C	Year 1	23.55		4.15	0.11	7.38	4.13
	Year 2	72.04			0.32		12.89
	Year 3	69.41			0.32		13.37
	Year 4	56.92		9.90	0.27	12.58	7.80
	Year 5	34.45		6.06	0.16	9.05	5.39
	Year 6				0.50		
	Year 7				0.50		
	Year 8				0.50		
	Year 9				0.48		
D	Year 1	23.93		4.23	0.11	7.80	4.30
	Year 2	72.58			0.32		14.28
	Year 3	68.04			0.31		12.39
	Year 4	61.92			0.30	13.40	8.41
	Year 5	59.99			0.29	14.35	8.82
	Year 6				0.50		
	Year 7				0.50		
	Year 8				0.50		
	Year 9				0.48		
SJVAPCD CEQA Threshold		100	10	10	27	15	15
General Conformity *de minimis* Threshold		NA	10	10	NA	100	100

Table 4-6.
Total Construction Emissions

Alt	Year	CO	NOx	ROG	SOx	PM_{10}	$PM_{2.5}$
		Tons per Year					

Notes:

[1.] Highlighted cells indicate emissions are above the CEQA significance threshold.

Key:

CEQA = California Environmental Quality Act
CO = carbon monoxide
NA = not applicable
NO_X = nitrogen oxides
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
ROG = reactive organic gas
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO_X = sulfur oxides

Table 4-7.
Ambient CO Concentrations-1hour

Alternative	Latitude (UTM)	Longitude (UTM)	Project Concentration (mg/m^3)	Background Concentration (mg/m^3)	Ambient air concentration (mg/m^3)
A	742100	4073300	5.30	2.34	7.64
B	742100	4073300	5.50	2.34	7.84
C	742100	4073300	5.51	2.34	7.85
D	742100	4073300	5.51	2.34	7.85

Notes:

To convert from ppm to mg/m^3 at standard conditions, multiply by 1.145.

Key:

UTM = Universal Transverse Mercator coordinate system northing (latitude) and easting (longitude) in meters.
mg/m^3 = milligrams per cubic meter
ppm = parts per million

Table 4-8.
Annual Ambient PM_{10} and $PM_{2.5}$Concentrations

Alternative	PM_{10} Project Concentration ($\mu g/m^3$)	$PM_{2.5}$ Project Concentration ($\mu g/m^3$)
A	1.76	0.82
B	1.34	0.75
C	1.35	0.55
D	1.22	0.77

Key:

$\mu g/m^3$ = micrograms per cubic meter

Mitigation Measure AQ-1A (Alternative A): ***Reduce Criteria Exhaust Emissions from Construction Equipment.*** This mitigation measure will apply to heavy-duty construction equipment used during the construction phase of the Project. All off-road construction diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices (e.g., diesel particulate filters), but in no case less clean than the average fleet mix as set forth in the ARB's latest Off-road Construction Emission Database. The contractor will document efforts it undertook to locate newer equipment (Tier 4, Tier 3, or Tier 2), alternative fueled equipment (electric, compressed natural gas, or gasoline), and addition of after-market control devices. This will be documented as part of compliance with the SJVAPCD's Indirect Source Review (ISR). The mitigation would reduce criteria exhaust emissions from construction equipment.

Implementation Action: For off-road construction diesel equipment, the contractor will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices (e.g., diesel particulate filters), but in no case less clean than the average fleet mix as set forth in the ARB's latest Off-road Construction Emission Database. The contractor will document efforts it undertook to locate newer equipment (Tier 4, Tier 3, or Tier 2), alternative fueled equipment (electric, compressed natural gas, or gasoline), and addition of after-market control devices.

Location: The mitigation will apply to all construction areas.

Effectiveness Criteria: Effectiveness will be based on the emissions calculated based on actual equipment used and operating hours with a minimum performance criteria equal to the average fleet mix as set forth in the ARB's latest Off-road Construction Emission Database. This will be detailed in the Air Impact Assessment and Monitoring and Reporting Schedule submitted to the SJVAPCD in conjunction with ISR Rule 9510.

Responsible Agency: U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and California State Lands Commission (CSLC).

Monitoring/Reporting Action: Adequacy of the proposed practices will be confirmed with Reclamation construction managers and CSLC monitors as detailed in the Monitoring and Reporting Schedule submitted to the SJVAPCD. The SJVAPCD would prepare a Monitoring and Reporting Schedule Compliance letter upon completion.

Timing: Mitigation will be ongoing over the construction timeframe.

Mitigation Measure AQ-1B (Alternative A): ***Reduce Criteria Exhaust Emissions from Material Hauling Vehicles.*** This mitigation measure will apply to material hauling vehicles used during the construction phase of the Project. Material hauling trips will be consolidated into the fewest trips possible. All material-hauling diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or

addition of after-market control devices (e.g., diesel particulate filters), but in no case less clean than the average fleet mix as set forth in the ARB's latest EMFAC emission database to any vehicle used that the contractor has control over (ARB 2007b). The contractor will document efforts it undertook to locate newer equipment, alternative fueled equipment (electric, compressed natural gas, or gasoline), and addition of after-market control devices. This will be documented as part of compliance with the SJVAPCD's ISR. The mitigation would reduce criteria exhaust emissions from material hauling vehicles.

Implementation Action: For material hauling vehicles, the contractor will consolidate trips into the fewest possible, use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices (e.g., diesel particulate filters), but in no case less clean than the average fleet mix as set forth in the ARB's latest EMFAC emission database. The contractor will document efforts it undertook to locate newer equipment, alternative fueled equipment (electric, compressed natural gas, or gasoline), and addition of after-market control devices.

Location: The mitigation will apply to all construction areas.

Effectiveness Criteria: Effectiveness will be based on the emissions calculated based on actual equipment used and operating hours with a minimum performance criteria equal to the average fleet mix as set forth in the ARB's latest EMFAC emission database. This will be detailed in the Air Impact Assessment and Monitoring and Reporting Schedule submitted to the SJVAPCD in conjunction with ISR Rule 9510.

Responsible Agency: Reclamation

Monitoring/Reporting Action: Adequacy of the proposed practices will be confirmed with Reclamation construction managers and CSLC monitors as detailed in the Monitoring and Reporting Schedule submitted to the SJVAPCD. The SJVAPCD would prepare a Monitoring and Reporting Schedule Compliance letter upon completion.

Timing: Mitigation will be ongoing over the construction timeframe.

Mitigation Measure AQ-1C (Alternative A): ***Offset Project Construction Emissions through a SJVAPCD Voluntary Emission Reduction Agreement***. This mitigation measure will require Reclamation to enter into a contractual agreement to mitigate by purchasing offsets to net zero the Project's actual emissions from exhaust equipment for ROG and NOx for any year that the emissions are projected to exceed the significance threshold based on the estimated construction emissions for any funded construction phase. This is required under the General Conformity Rule for projects that are above the *de minimis* threshold for ROG or NOx. The agreement will provide funds to the SJVAPCD's Emission Reduction Incentive Program to fund grants for projects that achieve emission reductions, thus offsetting Project-related impacts on air quality. At a

minimum, mitigation/offsets will occur in the year of impact, or as otherwise permitted by 40 CFR Part 93 Section 93.163.

Implementation Action: Reclamation will enter into a contractual agreement to mitigate by purchasing offsets to net zero the Project's actual emissions from exhaust equipment for ROG and NOx for any year that the emissions are projected to exceed the significance threshold based on the estimated construction emissions for any funded construction phase. The mitigation will offset construction emissions by providing funds to the SJVAPCD's Emission Reduction Incentive Program to fund grants for projects that achieve emission reductions.

Location: The mitigation will apply to all construction areas.

Effectiveness Criteria: Effectiveness will be based on actual equipment used and operating hours for any emissions that are not reduced by on-site mitigation. This will be detailed in the Air Impact Assessment and Monitoring and Reporting Schedule submitted to the SJVAPCD in conjunction with ISR Rule 9510.

Responsible Agency: Reclamation

Monitoring/Reporting Action: Adequacy of the proposed practices will be confirmed with the SJVAPCD as detailed in the Monitoring and Reporting Schedule submitted to the SJVAPCD. The SJVAPCD would prepare a Monitoring and Reporting Schedule Compliance letter upon completion.

Timing: Mitigation will be ongoing over the construction timeframe.

Given the current construction phase schedule, the implementation of Mitigation Measures AQ-1A, AQ-1B, and AQ-1C would decrease the ROG and NOx emissions with the remainder of emissions off-set using the Voluntary Emission Reduction Agreement outlined in mitigation measure AQ-1C. In accordance with the SJVAPCD draft GAMAQI, impacts after mitigation would be **less than significant** for Alternative A.

Impact AQ-2 (Alternative A): ***Conflict with Applicable Plans or Policies Related to Air Quality***. Compared to No-Action, Alternative A would implement the Project in Reach 2B and there would be short-term construction activities in the Project area. In addition, there would be a change in the operation related emissions of sources in the Project area. This includes emissions associated with vehicles traveling to the Project area for operation and maintenance of the existing facilities located in the Project area.

The SJVAPCD has several plans and policies relating to air emissions in the SJVAB. These specifically address ozone, PM_{10} and $PM_{2.5}$ as these are designated as non-attainment under the State and national AAQS. As part of this plan, the SJVAPCD has established significance thresholds of allowable emissions from Projects that would ensure consistency with these plans as they work to meet attainment of the Federal and State standards. The Project's emissions are above the ROG and NOx *de minimis*

emission thresholds established by the General Conformity Rule, which would conflict with plans and policies for obtaining national AAQS.

Compared to existing conditions, Project-related ROGs, NOx, PM_{10}, and $PM_{2.5}$ emissions are above the SJVAPCD's annual significance threshold during Project construction under Alternative A. Dispersion modeling of PM_{10} and $PM_{2.5}$ showed that the incremental increase in concentration of PM_{10} and $PM_{2.5}$ would not exceed the significant impact levels and would not be considered to substantially contribute to further exceedances of the ambient air quality standards. However, since ROG and NOx emissions may exceed the SJVAPCD's annual significance threshold, the Project may impede successful implementation of the State air quality attainment plans. Alternative A would result in a **significant** impact.

Mitigation Measure AQ-2 (Alternative A): ***Reduce or Offset Project Emissions.*** Refer to Mitigation Measures AQ-1A, AQ-1B, and AQ-1C (Alternative A). The same measures would be used here. Since Project-related emissions would be above the General Conformity Rule *de minimis* threshold shown in Table 4-6, the Project must satisfy the General Conformity Rule by either reducing emissions below the threshold, enacting a SIP amendment that includes the Project's ROG and NOx emissions, or purchasing offsets for all ROG and NOx emissions for any year in which the emissions exceed 10 tons per year. Compliance with any of these requirements would ensure that the Project does not conflict with applicable portions of the SIP. The mitigation measures AQ-1A, AQ-1B, and AQ-1C would reduce and/or offset construction emissions. Purchasing offsets will contribute to the SJVAPCD emissions reduction incentive program which is part of the strategies outlined in their plans to reach attainment for both ozone and particulate matter. This fund was highlighted as needing additional funds to reach the anticipated project needs for this program. Therefore, by contributing to this fund to offset the Project emissions, Alternative A impacts would be **less than significant**.

Implementation Action: Reduce or offset project emissions by implementing Mitigation Measures AQ-1A, AQ-1B, and AQ-1C.

Location: The mitigation will apply to all construction areas.

Effectiveness Criteria: Effectiveness will be based on actual equipment used and operating hours for any emissions that are not reduced by on-site mitigation. This will be detailed in the Air Impact Assessment and Monitoring and Reporting Schedule submitted to the SJVAPCD in conjunction with ISR Rule 9510.

Responsible Agency: Reclamation

Monitoring/Reporting Action: Adequacy of the proposed practices will be confirmed with the SJVAPCD or Reclamation construction managers and CSLC monitors, as detailed in the Monitoring and Reporting Schedule submitted to the SJVAPCD. The SJVAPCD would prepare a Monitoring and Reporting Schedule Compliance letter upon completion.

Timing: Mitigation will be ongoing over the construction timeframe.

Impact AQ-3 (Alternative A): ***Expose Sensitive Receptors to Substantial Air Pollutants Associated with Construction***. Compared to the No-Action Alternative, Alternative A would implement the Project and there would be short-term construction activities in the Project area. Construction emissions were estimated for the off-road construction equipment and material hauling vehicles which are diesel fueled. These diesel fueled equipment emit the toxic air contaminant diesel particulate matter. The emissions were estimated and along with air dispersion modeling the concentration in the air was estimated. An exposure assessment and health risk assessment was conducted for sensitive receptors in the Project area. The anticipated health impact for excess cancer risk and chronic hazard index are shown in Table 4-9. The threshold of significance is an increase in excess cancer risk greater than 10 in a million or a chronic hazard index greater than 1.

Table 4-9.
Health Impacts at Maximally Exposed Sensitive Receptor

Receptor Type	Alternative	Latitude (UTM)	Longitude (UTM)	Maximum Carcinogen Risk at Receptor in a million	Chronic Hazard Index
Resident Child	A	739738	4072804	77.36	0.04
	B			78.40	0.03
	C			61.60	0.03
	D			70.80	0.03
School Child	A	733752	4071015	60.30	0.03
	B			54.99	0.02
	C			37.03	0.02
	D			38.43	0.02

Notes:
1. The risk is based on a cancer potency factor for diesel particulate matter of 1.1. Individual years' concentration and age specific factors were used to arrive at the total risk.
2. The chronic hazard index is based on a Reference Exposure Level for diesel particulate matter of 5. The year with the highest concentration was used to calculate the chronic hazard index.

Key:
UTM = Universal Transverse Mercator coordinate system northing (latitude) and easting (longitude) in meters.

Sensitive receptors are projected to have an increase in the excess cancer risk for both resident child and school child exposure scenarios. The resident child would potentially be located along San Mateo Avenue which sees a significant amount of material hauling emissions as well as being located near construction work areas. The school child would be at Washington Elementary and would be exposed to material hauling emissions and construction work areas. There is not anticipated to be any non-cancer health effects since the chronic hazard index is less than 1. However, the health risk assessment indicates an increase in cancer risk above the threshold of 10 in a million for sensitive receptors.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-

Action Alternative). Given the results of the health risk assessment, which indicate that sensitive receptors would have an increase in excess cancer risk above the threshold of 10 in a million, the impact would be **significant**.

Mitigation Measure AQ-3A (Alternative A): ***Reduce Diesel Particulate Matter Emissions from Construction Equipment.*** This mitigation measure will apply to heavy-duty construction equipment used during the construction phase of the Project. All off-road construction diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices (e.g., diesel particulate filters), but in no case less clean than 85 percent reduction in particulate matter compared to a Tier 2 engine. The mitigation would reduce criteria exhaust emissions from construction equipment.

> **Implementation Action:** For off-road construction diesel equipment, the contractor will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices (e.g., diesel particulate filters), but in no case less clean than 85 percent reduction in particulate matter compared to a Tier 2 engine.
>
> **Location:** The mitigation will apply to all construction areas.
>
> **Effectiveness Criteria:** Effectiveness will be based on use of ARB certified after-market control devices or EPA certified engines.
>
> **Responsible Agency:** Reclamation
>
> **Monitoring/Reporting Action:** Adequacy of the proposed practices will be confirmed with Reclamation construction managers and CSLC monitors.
>
> **Timing:** Mitigation will be ongoing over the construction timeframe.

Mitigation Measure AQ-3B (Alternative A): ***Reduce Diesel Particulate Matter Emissions from Material Hauling Vehicles.*** This mitigation measure will apply to material hauling vehicles used during the construction phase of the Project. Material hauling trips will be consolidated into the fewest trips possible. All material-hauling diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices (e.g., diesel particulate filters), but in no case less clean than the average fleet mix as set forth in the ARB's latest EMFAC emission database to any vehicle used that the contractor has control over (ARB 2007b). The contractor will document efforts it undertook to locate newer equipment, alternative fueled equipment (electric, compressed natural gas, or gasoline), and addition of after-market control devices. The mitigation would reduce criteria exhaust emissions from material hauling vehicles.

> **Implementation Action:** For material hauling vehicles, the contractor will consolidate trips into the fewest possible, use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices (e.g., diesel particulate filters), but in no case less clean than the

average fleet mix as set forth in the ARB's latest EMFAC emission database. The contractor will document efforts it undertook to locate newer equipment, alternative fueled equipment (electric, compressed natural gas, or gasoline), and addition of after-market control devices.

Location: The mitigation will apply to all construction areas.

Effectiveness Criteria: Effectiveness will be based on the emissions calculated based on actual equipment used and operating hours with a minimum performance criteria equal to the average fleet mix as set forth in the ARB's latest EMFAC emission database. This will be detailed in the Air Impact Assessment and Monitoring and Reporting Schedule submitted to the SJVAPCD in conjunction with ISR Rule 9510.

Responsible Agency: Reclamation

Monitoring/Reporting Action: Adequacy of the proposed practices will be confirmed with Reclamation construction managers and CSLC monitors as detailed in the Monitoring and Reporting Schedule submitted to the SJVAPCD. The SJVAPCD would prepare a Monitoring and Reporting Schedule Compliance letter upon completion.

Timing: Mitigation will be ongoing over the construction timeframe.

If it is assumed that mitigation measures AQ-3A and AQ-3B could mitigate emissions by 85 percent for Alternative A, which is the maximum estimated if diesel particulate filters can be used by all equipment and trucks, this risk would be reduced to 18.3 in a million for the resident child. The excess cancer risk would still be above 10 in a million. This is due to the size of the construction Project and the receptors' close proximity to the roadway. Alternative A after mitigation would still have a substantial effect on exposure of sensitive receptors to health impacts. After mitigation, Alternative A impacts would remain **significant and unavoidable** in exposing sensitive receptors to substantial air pollutants.

Impact AQ-4 (Alternative A): ***Create Excess Amounts of Operational Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS***. Compared to the No-Action Alternative, Alternative A would implement the Project and there would be some operational activities in the Project area. Operation emissions are estimated to be from workers driving to the Project area to perform routine maintenance and operation activities associated with the water control structures. These emissions were quantified based on the anticipated number of worker trips. The operational emissions are shown in Table 4-10. These operational emissions were compared to the SJVAPCD's significance thresholds and the General Conformity Rule *de minimis* thresholds. The operational emissions do not exceed these thresholds.

Alternative A would also convert active agricultural areas to natural areas and open space reducing agricultural emissions in the Project area. Agricultural field operations, such as

tilling, planting, weeding, fertilizing, harvesting, and spreading of manure or compost can produce air pollution emissions from the mechanical movement of soil or from engine operation and fuel combustion. For example, wind erosion can transport dust after tillage (increasing PM_{10}) and fertilizer used for crops release ammonia to the atmosphere which mixes with other emissions to form microscopic airborne particles (increasing $PM_{2.5}$).

When comparing Alternative A to existing conditions, impacts would be similar to those described in in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Therefore, the operational related criteria air pollutants would result in a **less than significant** impact**.**

Table 4-10.
Total Operational Emissions

Alt	CO	NOx	ROG	SOx	PM_{10} Exhaust	PM_{10} Fugitive	PM_{10} Total	$PM_{2.5}$ Exhaust	$PM_{2.5}$ Fugitive	$PM_{2.5}$ Total
	tons									
A	0.032	0.004	0.002	0.0001	0.0005	0.024	0.0243	0.0003	0.006	0.0062
B	0.032	0.004	0.002	0.0001	0.0005	0.025	0.0256	0.0003	0.006	0.0066
C	0.032	0.004	0.002	0.0001	0.0005	0.025	0.0257	0.0003	0.006	0.0066
D	0.031	0.004	0.002	0.0001	0.0005	0.026	0.0262	0.0003	0.006	0.0067
SJVAPCD CEQA Threshold	100	10	10	27	NA	NA	15	NA	NA	15
General Conformity *de minimis* Threshold	NA	10	10	NA	NA	NA	100	NA	NA	100

Notes:

1. Emission factors are based on EMFAC for 2014 to be conservative as the starting year of operation varies (ARB 2007b).
2. Fugitive dust emissions are from travel on paved roads based on AP-42 Chapter 13.1.

Key:

CEQA = California Environmental Quality Act
CO = carbon monoxide
NA = not applicable
NO_X = nitrogen oxides
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
ROG = reactive organic gas
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO_X = sulfur oxides

Impact AQ-5 (Alternative A): ***Expose Sensitive Receptors to Substantial Air Pollutants Associated with Operation***. Compared to the No-Action Alternative, Alternative A would implement the Project and there would be operational activities in the Project area. Operational activities would be associated with workers driving to the site to perform routine maintenance and operation activities associated with the water control structures. Most of these vehicles would be gasoline fueled and the gasoline exhaust has significantly less toxicity compared to diesel exhaust. The number of additional trips added to the area near sensitive receptors is minimal. Therefore, there would not be a substantial source of operational related toxic air contaminants.

When comparing Alternative A to existing conditions, impacts would be similar to those described in in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). As a result, there would be a **less than significant** impact on sensitive receptors due to toxic air contaminants from Project operation.

Impact AQ-6 (Alternative A): *Create Objectionable Odors from Construction.* Compared to the No-Action Alternative, Alternative A would implement the Project and there would be construction activities in the Project area. Construction equipment and material hauling vehicles using diesel fuel may emit objectionable odors associated with combustion of the diesel fuel. However, these emissions would be transitory.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). Therefore, odor impacts associated with diesel combustion during construction activities would be a **less than significant** impact from odors.

Impact AQ-7 (Alternative A): *Create Objectionable Odors from Operation*. Compared to the No-Action Alternative, Alternative A would implement the Project and there would be operational activities in the Project area. The operational activities are associated with workers commuting to the Project area to perform routine operation and maintenance. The worker vehicles are not expected to noticeably increase the amount of odors associated with traffic along roads in the Project area.

When comparing Alternative A to existing conditions, impacts would be similar to those described in in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). Therefore, odor impacts associated with operational activities would result in a **less than significant** impact.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B would include construction of Project features including a Compact Bypass channel, a new levee system with a wide, consensus-based floodplain encompassing the river channel, and the Compact Bypass Bifurcation Structure with fish passage facility. Other key features include construction of a fish passage facility at the San Joaquin River control structure of the Chowchilla Bifurcation Structure, the re-route of Drive 10 ½ (across the Compact Bypass Control Structure), and removal of the San Mateo Avenue crossing. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Impact AQ-1 (Alternative B*): Create Excess Amounts of Construction Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS*. Compared to No-Action, Alternative B would implement the Project and there would be short-term construction activities in the Project area. Construction emissions were estimated for the off-road construction equipment, material hauling vehicles, worker commute vehicles, and fugitive dust emissions from construction and travel on roads. The construction emissions shown in Table 4-6 were compared to the General Conformity Rule *de minimis* threshold for NEPA. The General

Conformity Rule *de minimis* threshold would be exceeded for NOx and ROG and therefore construction emissions would be substantial.

Total construction emissions were compared to the SJVAPCD's significance thresholds for CEQA. CO, NOx, ROG, PM_{10}, and $PM_{2.5}$ criteria pollutants are above the annual emissions thresholds which indicate that the Project could cause a significant impact compared to existing conditions. The CO, $PM_{10,}$ and $PM_{2.5}$ emissions were modeled using air dispersion modeling to determine if the concentration, including background, was below the AAQS or below a significant impact level in the local area. NOx and ROG emissions were not modeled as these are ozone precursors and contribute to the regional ozone problem.

The modeled CO maximum concentration from Project sources is shown in Table 4-7. This was combined with the background concentration based on the average 1 hour for 2010 to 2013. This indicates that at the point of maximum impact, the CO concentration is less than the AAQS. Therefore the Project, after modeling, indicates that there is less than significant impact for CO.

The modeled PM_{10} and $PM_{2.5}$ maximum concentrations from Project sources are shown in Table 4-8. Since the SJVAB is already in non-attainment for both PM_{10} and $PM_{2.5}$, a concentration above the significant impact level would contribute to the existing exceedances of the AAQS. The significant impact levels are based on the Prevention of Significant Deterioration thresholds set by the SJVAPCD. The Fugitive PM_{10} annual significant impact level is 2.08 $\mu g/m^3$. The EPA vacated the $PM_{2.5}$ and Fugitive $PM_{2.5}$ annual significant impact level in 2013. As there is no adopted $PM_{2.5}$ significant impact level, the SJVAPCD recommends using the corresponding PM_{10} significant impact level for both PM_{10} and $PM_{2.5}$ analyses (Villalvazo, pers. comm., 2014). Therefore, 2.08 $\mu g/m^3$ is used as the Fugitive $PM_{2.5}$ annual significant impact level. As shown in Table 4-8 the PM_{10} and $PM_{2.5}$ Project concentrations are below this significance level. Therefore, the construction emissions of PM_{10} and $PM_{2.5}$ are less than significant impacts. The calculated fugitive dust emissions would be further reduced if control measures from compliance with SJVAPCD Regulation VIII were quantified; as such, the fugitive dust emissions stated here are conservative because these control measures would be required through mandatory compliance with SJVAPCD Regulation VIII. Compliance with SJVAPCD Regulation VIII would reduce PM_{10} emissions (predominantly dust/dirt) generated by human activity, including construction and demolition activities, road construction, bulk materials storage, paved and unpaved roads, carryout and track out, and landfill operations.

As discussed above, NOx, ROG are above the SJVAPCD annual emissions thresholds for regional air quality. Therefore, Alternative B would cause a **significant** impact for construction-related criteria air pollutants for NOx and ROG.

Mitigation Measure AQ-1A (Alternative B): ***Reduce Criteria Exhaust Emissions from Construction Equipment.*** Refer to Mitigation Measure AQ-1A (Alternative A). The same measure would be used here. All off-road construction diesel equipment will use

the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices.

Mitigation Measure AQ-1B (Alternative B): ***Reduce Criteria Exhaust Emissions from Material Hauling Vehicles.*** Refer to Mitigation Measure AQ-1B (Alternative A). The same measure would be used here. Material hauling trips will be consolidated into the fewest trips possible. All material hauling diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices.

Mitigation Measure AQ-1C (Alternative B): ***Offset Project Construction Emissions through a SJVAPCD Voluntary Emission Reduction Agreement***. Refer to Mitigation Measure AQ-1C (Alternative A). The same measure would be used here. This mitigation measure will require Reclamation to enter into a contractual agreement to mitigate by purchasing offset to net zero the Project's actual emissions from exhaust equipment for ROG and NOx.

Implementation of these mitigation measures would decrease the ROG and NOx emissions with the remainder of emissions off-set using the Voluntary Emission Reduction Agreement outlined in mitigation measure AQ-1C. According to the SJVAPCD draft GAMAQI, impacts after mitigation would be **less than significant**.

Impact AQ-2 (Alternative B): ***Conflict with Applicable Plans or Policies Related to Air Quality***. Compared to No-Action, Alternative B would implement the Project and there would be short-term construction activities in the Project area. In addition, there would be a change in the operations related emissions from sources in the Project area. This includes emissions associated with vehicles traveling to the Project area for operation and maintenance of the existing facilities located in the Project area. The SJVAPCD has several plans and policies relating to air emissions in the SJVAB. These specifically address ozone, PM_{10} and $PM_{2.5}$ as these are designated as non-attainment under the State and national AAQS. As part of this plan the SJVAPCD has established significance thresholds of allowable emissions from Projects that would ensure consistency with these plans as they work to meet attainment of the Federal and State standards. These thresholds of significance are also consistent with the General Conformity Rule *de minimis* thresholds. The Project's emissions are above the ROG and NOx emission thresholds established by the General Conformity Rule. This would conflict with plans and policies for obtaining national AAQS.

Compared to existing conditions, Project emissions of ROG, NOx, PM_{10}, and $PM_{2.5}$ are above the SJVAPCD's annual significance threshold during Project construction under Alternative B. Dispersion modeling of PM_{10} and $PM_{2.5}$ showed that the incremental increase in concentration of PM_{10} and $PM_{2.5}$ would not exceed the significant impact levels and would not be considered to substantially contribute to further exceedances of the ambient air quality standards. However, since ROG and NOx emissions may exceed the SJVAPCD's annual significance threshold, the Project may impede the implementation of the State air quality attainment plans. Alternative B would result in a **significant** impact.

Mitigation Measure AQ-2 (Alternative B): ***Reduce or Offset Project Emissions.*** Refer to Mitigation Measure AQ-2 (Alternative A). The same measure would be used here. This mitigation measure would reduce criteria exhaust emissions from construction equipment and material hauling vehicles and would offset project construction emissions through a SJVAPCD Voluntary Emission Reduction Agreement. Impacts after mitigation would be **less than significant**.

Impact AQ-3 (Alternative B): ***Expose Sensitive Receptors to Substantial Air Pollutants Associated with Construction***. Compared to the No-Action Alternative, Alternative B would implement the Project and there would be short-term construction activities in the Project area. Construction emissions were estimated for the off-road construction equipment and material hauling vehicles which are diesel fueled. These diesel fueled equipment emit the toxic air contaminant diesel particulate matter. The emissions were estimated and along with air dispersion modeling the concentration in the air was estimated. An exposure assessment and health risk assessment was conducted for sensitive receptors in the Project area. The anticipated health impact for excess cancer risk and chronic hazard index are shown in Table 4-9. The threshold of significance is an increase in excess cancer risk greater than 10 in a million or a chronic hazard index greater than 1.

Sensitive receptors are projected to have an increase in the excess cancer risk for both a resident child and school child exposure scenario. The resident child is located along San Mateo Avenue which sees a significant amount of material hauling emissions as well as being located near construction work areas. The school child is at Washington Elementary and is exposed to material hauling emissions and construction work areas. There is not anticipated to be any non-cancer health effects since the chronic hazard index is less than 1. However, the health risk assessment indicates an increase in cancer risk above the threshold of 10 in a million for sensitive receptors.

When comparing Alternative B to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative B to the No-Action Alternative). Given the results of the health risk assessment which indicate that sensitive receptors would have an increase in excess cancer risk above the threshold of 10 in a million, the impact would be **significant**.

Mitigation Measure AQ-3A (Alternative B): ***Reduce Diesel Particulate Matter Emissions from Construction Equipment.*** Refer to Mitigation Measure AQ-3A (Alternative A). The same measure would be used here. All off-road construction diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices.

Mitigation Measure AQ-3B (Alternative B): ***Reduce Diesel Particulate Matter Emissions from Material Hauling Vehicles.*** Refer to Mitigation Measure AQ-3B (Alternative A). The same measure would be used here. Material hauling trips will be consolidated into the fewest trips possible. All material hauling diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices.

If it is assumed that mitigation measures AQ-3A and AQ-3B could mitigate emissions by 85 percent which is the maximum estimated if diesel particulate filters can be used by all equipment and trucks, the risk associated with Alternative B would be reduced to 17.85 in a million for the resident child. The excess cancer risk would still be above 10 in a million. This is due to the size of the construction project and the receptors' close proximity to the roadway. Alternative B after mitigation would still have a substantial effect on exposure of sensitive receptors to health impacts. After mitigation, Alternative B impacts would remain **significant and unavoidable** in exposing sensitive receptors to substantial air pollutants.

Impact AQ-4 (Alternative B): ***Create Excess Amounts of Operational Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS***. Compared to the No-Action Alternative, Alternative B would implement the Project and there would be some operational activities in the Project area. Operation emissions are estimated to be from workers driving to the Project area to do routine maintenance and operation activities associated with the water control structures. There are no other sources of emissions anticipated with operation of the Project. These emissions were quantified based on the anticipated number of worker trips. The operational emissions are shown in Table 4-10. These operational emissions were compared to the SJVAPCD's significance thresholds and the General Conformity Rule *de minimis* thresholds. The operational emissions do not exceed these thresholds.

Alternative B would also convert active agricultural areas to natural areas and open space reducing agricultural emissions in the Project area. Agricultural field operations, such as tilling, planting, weeding, fertilizing, harvesting, and spreading of manure or compost can produce air pollution emissions from the mechanical movement of soil or from engine operation and fuel combustion.

When comparing Alternative B to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative B to the No-Action Alternative). Therefore, the operational related criteria air pollutants would result in a **less than significant** impact.

Impact AQ-5 (Alternative B): ***Expose Sensitive Receptors to Substantial Air Pollutants Associated with Operation***. Compared to the No-Action Alternative, Alternative B would implement the Project and there would be operational activities in the Project area. Operational activities would be associated with workers driving to the site to perform routine maintenance and operation activities associated with the water control structures. Most of these vehicles would be gasoline fueled and the gasoline exhaust has significantly less toxicity compared to diesel exhaust. The number of additional trips added to the area near sensitive receptors is minimal. Therefore, there would not be a substantial source of operational related toxic air contaminants.

When comparing Alternative B to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to the No-

Action Alternative). As a result, there would be a **less than significant** impact on sensitive receptors due to toxic air contaminants from operation of Alternative B.

Impact AQ-6 (Alternative B): *Create Objectionable Odors from Construction.* Compared to the No-Action Alternative, Alternative B would implement the Project and there would be construction activities in the Project area. Construction equipment and material hauling vehicles using diesel fuel may emit objectionable odors associated with combustion of the diesel fuel. However, these emissions would be transitory.

When comparing Alternative B to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to the No-Action Alternative). Therefore, odor impacts of Alternative B associated with diesel combustion during construction activities would be a **less than significant** impact from odors.

Impact AQ-7 (Alternative B): *Create Objectionable Odors from Operation*. Compared to the No-Action Alternative, Alternative B would implement the Project and there would be operational activities in the Project area. The operational activities are associated with workers commuting to the Project area to perform routine operation and maintenance. The worker vehicles are not expected to noticeably increase the amount of odors associated with traffic along roads in the Project area.

When comparing Alternative B to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to the No-Action Alternative). Therefore, odor impacts of Alternative B associated with operational activities would result in a **less than significant** impact.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C would include construction of Project features including Fresno Slough Dam, a new levee system with a narrow floodplain encompassing the river channel, and the Short Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the Short Canal control structure and fish screen, construction of a fish passage facility at the San Joaquin River control structure of the Chowchilla Bifurcation Structure, modification of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Impact AQ-1 (Alternative C*): Create Excess Amounts of Construction Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS*. Compared to No-Action, Alternative C would implement the Project and there would be short-term construction activities in the Project area. Construction emissions were estimated for the off-road construction equipment, material hauling vehicles, worker commute vehicles, and fugitive dust emissions from construction and travel on roads. These construction emissions shown in Table 4-6 were compared to the General Conformity Rule *de minimis* thresholds for NEPA. The General Conformity Rule *de minimis* threshold would be exceeded for NOx and ROG and therefore construction emissions would be substantial.

Total construction emissions were compared to the SJVAPCD's significance thresholds for CEQA. CO, NOx, ROG, PM_{10}, and $PM_{2.5}$ criteria pollutants are above the annual emissions thresholds which indicate that the Project could cause a significant impact compared to existing conditions. The CO, $PM_{10,}$ and $PM_{2.5}$ emissions were modeled using air dispersion modeling to determine if the concentration including background was below the AAQS or below a significant impact level in the local area. NOx and ROG emissions were not modeled as these are ozone precursors and contribute to the regional ozone problem.

The modeled CO maximum concentration from project sources is shown in Table 4-7. This was combined with the background concentration based on the average 1 hour for 2010 to 2013. This indicates that at the point of maximum impact, the CO concentration is less than the AAQS. Therefore the Project, after modeling, indicates that it is less than significant impact for CO.

The modeled PM_{10} and $PM_{2.5}$ maximum concentrations from Project sources are shown in Table 4-8. Since the SJVAB is already significant for both PM_{10} and $PM_{2.5}$, a significant impact would significantly contribute to the existing exceedances of the AAQS. These significant impact levels are based on the Prevention of Significant Deterioration thresholds set by the SJVAPCD. The Fugitive PM_{10} annual significant impact level is 2.08 $\mu g/m^3$. The EPA vacated the $PM_{2.5}$ and Fugitive $PM_{2.5}$ annual significant impact level in 2013. As there is no adopted $PM_{2.5}$ significant impact level, the SJVAPCD recommends using the corresponding PM_{10} significant impact level for both PM_{10} and $PM_{2.5}$ analyses (Villalvazo, pers. comm., 2014). Therefore, 2.08 $\mu g/m^3$ is used as the Fugitive $PM_{2.5}$ annual significant impact level. As shown in Table 4-8 the PM_{10} and $PM_{2.5}$ Project concentrations are below this significance level. Therefore, after modeling, the construction emissions of PM_{10} and $PM_{2.5}$ are less than significant impacts. The calculated fugitive dust emissions would be further reduced if control measures from compliance with SJVAPCD Regulation VIII were quantified; as such, the fugitive dust emissions stated here are conservative because these control measures would be required through mandatory compliance with SJVAPCD Regulation VIII. Compliance with SJVAPCD Regulation VIII would reduce PM_{10} emissions (predominantly dust/dirt) generated by human activity, including construction and demolition activities, road construction, bulk materials storage, paved and unpaved roads, carryout and track out, and landfill operations.

As discussed above, NOx, ROG are above the SJVAPCD annual emissions thresholds for regional air quality. Therefore, Alterative C would cause a **significant** impact for construction-related criteria air pollutants for NOx and ROG.

Mitigation Measure AQ-1A (Alternative C): ***Reduce Criteria Exhaust Emissions from Construction Equipment.*** Refer to Mitigation Measure AQ-1A (Alternative A). The same measure would be used here. All off-road construction diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices.

Mitigation Measure AQ-1B (Alternative C): ***Reduce Criteria Exhaust Emissions from Material Hauling Vehicles.*** Refer to Mitigation Measure AQ-1B (Alternative A). The same measure would be used here. Material hauling trips will be consolidated into the fewest trips possible. All material hauling diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices.

Mitigation Measure AQ-1C (Alternative C): ***Offset Project Construction Emissions through a SJVAPCD Voluntary Emission Reduction Agreement***. Refer to Mitigation Measure AQ-1C (Alternative A). The same measure would be used here. This mitigation measure will require Reclamation to enter into a contractual agreement to mitigate by purchasing offset to net zero the project's actual emissions from equipment exhaust for ROG and NOx.

Implementation of these mitigation measures would decrease the ROG and NOx emissions with the remainder of emissions off-set using the Voluntary Emission Reduction Agreement outlined in mitigation measure AQ-1C. According to the SJVAPCD draft GAMAQI, impacts after mitigation would be **less than significant**.

Impact AQ-2 (Alternative C): ***Conflict with Applicable Plans or Policies Related to Air Quality***. Compared to No-Action, Alternative C would implement the Project and there would be short-term construction activities in the Project area. In addition, there would be a change in the operations related emissions from sources in the Project area. This includes emissions associated with vehicles traveling to the Project area for operation and maintenance of the existing facilities located in the Project area. The SJVAPCD has several plans and policies relating to air emissions in the SJVAB. These specifically address ozone, PM_{10} and $PM_{2.5}$ as these are designated as non-attainment under the State and national AAQS. As part of this plan the SJVAPCD has established significance thresholds of allowable emissions from Projects that would ensure consistency with these plans as they work to meet attainment of the Federal and State standards. These thresholds of significance are also consistent with the General Conformity Rule *de minimis* thresholds. The Project's emissions are above the ROG and NOx emission thresholds established by the General Conformity Rule. This would conflict with plans and policies for obtaining national AAQS.

Compared to existing conditions, Project emissions of ROG, NOx, PM_{10}, and $PM_{2.5}$ are above the SJVAPCD's annual significance threshold during Project construction under Alternative C. Dispersion modeling of PM_{10} and $PM_{2.5}$ showed that the incremental increase in concentration of PM_{10} and $PM_{2.5}$ would not exceed the significant impact levels and would not be considered to substantially contribute to further exceedances of the ambient air quality standards. However, since ROG and NOx emissions may exceed the SJVAPCD's annual significance threshold, the Project may impede the implementation of the State air quality attainment plans. Alternative C would result in a **significant** impact.

Mitigation Measure AQ-2 (Alternative C): ***Reduce or Offset Project Emissions.*** Refer to Mitigation Measure AQ-2 (Alternative A). The same measure would be used here.

This mitigation measure would reduce criteria exhaust emissions from construction equipment and material hauling vehicles and would offset project construction emissions through a SJVAPCD Voluntary Emission Reduction Agreement. Impacts after mitigation would be **less than significant**.

Impact AQ-3 (Alternative C): ***Expose Sensitive Receptors to Substantial Air Pollutants Associated with Construction***. Compared to the No-Action Alternative, Alternative C would implement the Project and there would be short-term construction activities in the Project area. Construction emissions were estimated for the off-road construction equipment and material hauling vehicles which are diesel fueled. These diesel fueled equipment emit the toxic air contaminant diesel particulate matter. The emissions were estimated and along with air dispersion modeling the concentration in the air was estimated. An exposure assessment and health risk assessment was conducted for sensitive receptors in the Project area. The anticipated health impact for excess cancer risk and chronic hazard index are shown in Table 4.9. The threshold of significance is an increase in excess cancer risk greater than 10 in a million or a chronic hazard index greater than 1.

Sensitive receptors are projected to have an increase in the excess cancer risk for both a resident child and school child exposure scenario. The resident child is located along San Mateo Avenue which sees a significant amount of material hauling emissions as well as being located near construction work areas. The school child is at Washington Elementary and is exposed to material hauling emissions and construction work areas. There is not anticipated to be any non-cancer health effects since the chronic hazard index is less than 1. However, the health risk assessment indicates an increase in cancer risk above the threshold of 10 in a million for sensitive receptors.

When comparing Alternative C to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative C to the No-Action Alternative). Given the results of the health risk assessment which indicate that sensitive receptors would have an increase in excess cancer risk above the threshold of 10 in a million, the impact would be **significant**.

Mitigation Measure AQ-3A (Alternative C): ***Reduce Diesel Particulate Matter Emissions from Construction Equipment.*** Refer to Mitigation Measure AQ-3A (Alternative A). The same measure would be used here. All off-road construction diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices.

Mitigation Measure AQ-3B (Alternative C): ***Reduce Diesel Particulate Matter Emissions from Material Hauling Vehicles.*** Refer to Mitigation Measure AQ-3B (Alternative A). The same measure would be used here. Material hauling trips will be consolidated into the fewest trips possible. All material hauling diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices.

If it is assumed that mitigation measures AQ-3A and AQ-3B could mitigate emissions by 85 percent which is the maximum estimated if diesel particulate filters can be used by all equipment and trucks, the risk associated with Alternative C would be reduced to 13.95 in a million for the resident child. The excess cancer risk would still be above 10 in a million. This is due to the size of the construction project and the receptors' close proximity to the roadway. Alternative C after mitigation would still have a substantial effect on exposure of sensitive receptors to health impacts. After mitigation, Alternative C impacts would remain **significant and unavoidable** in exposing sensitive receptors to substantial air pollutants.

Impact AQ-4 (Alternative C): ***Create Excess Amounts of Operational Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS***. Compared to the No-Action Alternative, Alternative C would implement the Project and there would be some operational activities in the Project area. Operation emissions are estimated to be from workers driving to the Project area to do routine maintenance and operation activities associated with the water control structures. There are no other sources of emissions anticipated with operation of the Project. These emissions were quantified based on the anticipated number of worker trips. The operational emissions are shown in Table 4-10.These operational emissions were compared to the SJVAPCD's significance thresholds and the General Conformity Rule *de minimis* thresholds. The operational emissions do not exceed these thresholds.

Alternative C would also convert active agricultural areas to natural areas and open space reducing agricultural emissions in the Project area. Agricultural field operations, such as tilling, planting, weeding, fertilizing, harvesting, and spreading of manure or compost can produce air pollution emissions from the mechanical movement of soil or from engine operation and fuel combustion.

When comparing Alternative C to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative C to the No-Action Alternative). Therefore, the operational related criteria air pollutants would result in a **less than significant** impact.

Impact AQ-5 (Alternative C): ***Expose Sensitive Receptors to Substantial Air Pollutants Associated with Operation***. Compared to the No-Action Alternative, Alternative C would implement the Project and there would be operational activities in the Project area. Operational activities would be associated with workers driving to the site to perform routine maintenance and operation activities associated with the water control structures. Most of these vehicles would be gasoline fueled and the gasoline exhaust has significantly less toxicity compared to diesel exhaust. The number of additional trips added to the area near sensitive receptors is minimal. Therefore, there would not be a substantial source of operational related toxic air contaminants.

When comparing Alternative C to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative C to the No-

Action Alternative). As a result, there would be a **less than significant** impact on sensitive receptors due to toxic air contaminants from operation of Alternative C.

Impact AQ-6 (Alternative C): *Create Objectionable Odors from Construction.* Compared to the No-Action Alternative, Alternative C would implement the Project and there would be construction activities in the Project area. Construction equipment and material hauling vehicles using diesel fuel may emit objectionable odors associated with combustion of the diesel fuel. However, these emissions would be transitory.

When comparing Alternative C to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative C to the No-Action Alternative). Therefore, odor impacts of Alternative C associated with diesel combustion during construction activities would be a **less than significant** impact from odors.

Impact AQ-7 (Alternative C): *Create Objectionable Odors from Operation*. Compared to the No-Action Alternative, Alternative C would implement the Project and there would be operational activities in the Project area. The operational activities are associated with workers commuting to the Project area to perform routine operation and maintenance. The worker vehicles are not expected to noticeably increase the amount of odors associated with traffic along roads in the Project area.

When comparing Alternative C to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative C to the No-Action Alternative). Therefore, odor impacts of Alternative C associated with operational activities would result in a **less than significant** impact.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D would include construction of Project features including Fresno Slough Dam, a new levee system with a wide floodplain encompassing the river channel, and the North Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the North Canal bifurcation structure, and the North Canal fish passage facility, removal of the San Joaquin River control structure of the Chowchilla Bifurcation Structure, removal of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Impact AQ-1 (Alternative D*): Create Excess Amounts of Construction Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS*. Compared to No-Action, Alternative D would implement the Project and there would be short-term construction activities in the Project area. Construction emissions were estimated for the off-road construction equipment, material hauling vehicles, worker commute vehicles, and fugitive dust emissions from construction and travel on roads. The construction emissions shown in Table 4-6 were compared to the General Conformity Rule *de minimis* thresholds for NEPA. The General Conformity Rule *de minimis* threshold would be exceeded for NOx and ROG and therefore construction emissions would be substantial.

Total construction emissions were compared to the SJVAPCD's significance thresholds for CEQA. CO, NOx, ROG, PM_{10}, and $PM_{2.5}$ criteria pollutants are above the annual emissions thresholds which indicate that the Project could cause a significant impact compared to existing conditions. The CO, $PM_{10,}$ and $PM_{2.5}$ emissions were modeled using air dispersion modeling to determine if the concentration including background was below the AAQS or below a significant impact level in the local area. NOx and ROG emissions were not modeled as these are ozone precursors and contribute to the regional ozone problem.

The modeled CO maximum concentration from project sources is shown in Table 4-7. This was combined with the background concentration based on the average 1 hour for 2010 to 2013. This indicates that at the point of maximum impact, the CO concentration is less than the AAQS. Therefore the Project, after modeling, indicates that it is less than significant impact for CO.

The modeled PM_{10} and $PM_{2.5}$ maximum concentrations from Project sources are shown in Table 4-8. Since the SJVAB is already significant for both PM_{10} and $PM_{2.5}$, a significant impact would significantly contribute to the existing exceedances of the AAQS. These significant impact levels are based on the Prevention of Significant Deterioration thresholds set by the SJVAPCD. The Fugitive PM_{10} annual significant impact level is 2.08 $\mu g/m^3$. The EPA vacated the $PM_{2.5}$ and Fugitive $PM_{2.5}$ annual significant impact level in 2013. As there is no adopted $PM_{2.5}$ significant impact level, the SJVAPCD recommends using the corresponding PM_{10} significant impact level for both PM_{10} and $PM_{2.5}$ analyses (Villalvazo, pers. comm., 2014). Therefore, 2.08 $\mu g/m^3$ is used as the Fugitive $PM_{2.5}$ annual significant impact level. As shown in Table 4-8 the PM_{10} and $PM_{2.5}$ Project concentrations are below this significance level. Therefore, after modeling, the construction emissions of PM_{10} and $PM_{2.5}$ are less than significant impacts. The calculated fugitive dust emissions would be further reduced if control measures from compliance with SJVAPCD Regulation VIII were quantified; as such, the fugitive dust emissions stated here are conservative because these control measures would be required through mandatory compliance with SJVAPCD Regulation VIII. Compliance with SJVAPCD Regulation VIII would reduce PM_{10} emissions (predominantly dust/dirt) generated by human activity, including construction and demolition activities, road construction, bulk materials storage, paved and unpaved roads, carryout and track out, and landfill operations.

As discussed above, NOx, ROG are above the SJVAPCD annual emissions thresholds for regional air quality. Therefore, Alternative D would cause a **significant** impact for construction-related criteria air pollutants for NOx and ROG.

Mitigation Measure AQ-1A (Alternative D): ***Reduce Criteria Exhaust Emissions from Construction Equipment.*** Refer to Mitigation Measure AQ-1A (Alternative A). The same measure would be used here. All off-road construction diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices.

Mitigation Measure AQ-1B (Alternative D): ***Reduce Criteria Exhaust Emissions from Material Hauling Vehicles.*** Refer to Mitigation Measure AQ-1B (Alternative A). The same measure would be used here. Material hauling trips will be consolidated into the fewest trips possible. All material hauling diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices.

Mitigation Measure AQ-1C (Alternative D): ***Offset Project Construction Emissions through a SJVAPCD Voluntary Emission Reduction Agreement***. Refer to Mitigation Measure AQ-1C (Alternative A). The same measure would be used here. This mitigation measure will require Reclamation to enter into a contractual agreement to mitigate by purchasing offset to net zero the project's actual emissions from equipment exhaust for ROG and NOx.

Implementation of these mitigation measures would decrease the ROG and NOx emissions with the remainder of emissions off-set using the Voluntary Emission Reduction Agreement outlined in mitigation measure AQ-1C. According to the SJVAPCD draft GAMAQI, impacts after mitigations would be **less than significant**.

Impact AQ-2 (Alternative D): ***Conflict with Applicable Plans or Policies Related to Air Quality***. Compared to No-Action, Alternative D would implement the Project and there would be short-term construction activities in the Project area. In addition, there would be a change in the operations related emissions from sources in the Project area. This includes emissions associated with vehicles traveling to the Project area for operation and maintenance of the existing facilities located in the Project area. The SJVAPCD has several plans and policies relating to air emissions in the SJVAB. These specifically address ozone, $PM_{10,}$ and $PM_{2.5,}$ as these are designated as non-attainment under the State and national AAQS. As part of this plan the SJVAPCD has established significance thresholds of allowable emissions from Projects that would ensure consistency with these plans as they work to meet attainment of the Federal and State standards. These thresholds of significance are also consistent with the General Conformity Rule *de minimis* thresholds. The Project's emissions are above the ROG and NOx emission thresholds established by the General Conformity Rule. This would conflict with plans and policies for obtaining national AAQS.

Compared to existing conditions, Project emissions of ROG, NOx, PM_{10}, and $PM_{2.5}$ are above the SJVAPCD's annual significance threshold during Project construction under Alternative D. Dispersion modeling of PM_{10} and $PM_{2.5}$ showed that the incremental increase in concentration of PM_{10} and $PM_{2.5}$ would not exceed the significant impact levels and would not be considered to substantially contribute to further exceedances of the ambient air quality standards. However, since ROG and NOx emissions may exceed the SJVAPCD's annual significance threshold, the Project may impede the implementation of the State air quality attainment plans. Alternative D would results in a **significant** impact.

Mitigation Measure AQ-2 (Alternative D): ***Reduce or Offset Project Emissions.*** Refer to Mitigation Measure AQ-2 (Alternative A). The same measure would be used here.

This mitigation measure would reduce criteria exhaust emissions from construction equipment and material hauling vehicles and would offset project construction emissions through a SJVAPCD Voluntary Emission Reduction Agreement. Impacts after mitigation would be **less than significant**.

Impact AQ-3 (Alternative D): ***Expose Sensitive Receptors to Substantial Air Pollutants Associated with Construction***. Compared to the No-Action Alternative, Alternative D would implement the Project and there would be short-term construction activities in the Project area. Construction emissions were estimated for the off-road construction equipment and material hauling vehicles which are diesel fueled. These diesel fueled equipment emit the toxic air contaminant diesel particulate matter. The emissions were estimated and along with air dispersion modeling the concentration in the air was estimated. An exposure assessment and health risk assessment was conducted for sensitive receptors in the Project area. The anticipated health impact for excess cancer risk and chronic hazard index are shown in Table 4-9. The threshold of significance is an increase in excess cancer risk greater than 10 in a million or a chronic hazard index greater than 1.

Sensitive receptors are projected to have an increase in the excess cancer risk for both a resident child and school child exposure scenario. The resident child is located along San Mateo Avenue which sees a significant amount of material hauling emissions as well as being located near construction work areas. The school child is at Washington Elementary and is exposed to material hauling emissions and construction work areas. There is not anticipated to be any non-cancer health effects since the chronic hazard index is less than 1. However, the health risk assessment indicates an increase in cancer risk above the threshold of 10 in a million for sensitive receptors.

When comparing Alternative D to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative D to the No-Action Alternative). Given the results of the health risk assessment which indicate that sensitive receptors would have an increase in excess cancer risk above the threshold of 10 in a million, the impact would be **significant**.

Mitigation Measure AQ-3A (Alternative D): ***Reduce Diesel Particulate Matter Emissions from Construction Equipment.*** Refer to Mitigation Measure AQ-3A (Alternative A). The same measure would be used here. All off-road construction diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices.

Mitigation Measure AQ-3B (Alternative D): ***Reduce Diesel Particulate Matter Emissions from Material Hauling Vehicles.*** Refer to Mitigation Measure AQ-3B (Alternative A). The same measure would be used here. Material hauling trips will be consolidated into the fewest trips possible. All material hauling diesel equipment will use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices.

If it is assumed that mitigation measures AQ-3A and AQ-3B could mitigate emissions by 85 percent which is the maximum estimated if diesel particulate filters can be used by all equipment and trucks, the risk associated with Alternative D would be reduced to 16.65 in a million for the resident child. The excess cancer risk would still be above 10 in a million. This is due to the size of the construction project and the receptors' close proximity to the roadway. Alternative D after mitigation would still have a substantial effect on exposure of sensitive receptors to health impacts. After mitigation, Alternative D impacts would remain **significant and unavoidable** in exposing sensitive receptors to substantial air pollutants.

Impact AQ-4 (Alternative D): ***Create Excess Amounts of Operational Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS***. Compared to the No-Action Alternative, Alternative A would implement the Project and there would be some operational activities in the Project area. Operation emissions are estimated to be from workers driving to the Project area to do routine maintenance and operation activities associated with the water control structures. There are no other sources of emissions anticipated with operation of the Project. These emissions were quantified based on the anticipated number of worker trips. The operational emissions are shown in Table 4-10. These operational emissions were compared to the SJVAPCD's significance thresholds and the General Conformity Rule *de minimis* thresholds. The operational emissions do not exceed these thresholds.

Alternative D would also convert active agricultural areas to natural areas and open space reducing agricultural emissions in the Project area. Agricultural field operations, such as tilling, planting, weeding, fertilizing, harvesting, and spreading of manure or compost can produce air pollution emissions from the mechanical movement of soil or from engine operation and fuel combustion.

When comparing Alternative D to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative D to the No-Action Alternative). Therefore, the operational related criteria air pollutants would result in a **less than significant** impact.

Impact AQ-5 (Alternative D): ***Expose Sensitive Receptors to Substantial Air Pollutants Associated with Operation***. Compared to the No-Action Alternative, Alternative D would implement the Project and there would be operational activities in the Project area. Operational activities would be associated with workers driving to the site to perform routine maintenance and operation activities associated with the water control structures. Most of these vehicles would be gasoline fueled and the gasoline exhaust has significantly less toxicity compared to diesel exhaust. The number of additional trips added to the area near sensitive receptors is minimal. Therefore, there would not be a substantial source of operational related toxic air contaminants.

When comparing Alternative D to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative D to the No-

Action Alternative). As a result, there would be a **less than significant** impact on sensitive receptors due to toxic air contaminants from Project operation of Alternative D.

Impact AQ-6 (Alternative D): ***Create Objectionable Odors from Construction.*** Compared to the No-Action Alternative, Alternative D would implement the Project and there would be construction activities in the Project area. Construction equipment and material hauling vehicles using diesel fuel may emit objectionable odors associated with combustion of the diesel fuel. However, these emissions would be transitory.

When comparing Alternative D to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative D to the No-Action Alternative). Therefore, odor impacts of Alternative D associated with diesel combustion during construction activities would be a **less than significant** impact from odors.

Impact AQ-7 (Alternative D): ***Create Objectionable Odors from Operation.*** Compared to the No-Action Alternative, Alternative D would implement the Project and there would be operational activities in the Project area. The operational activities are associated with workers commuting to the Project area to perform routine operation and maintenance. The worker vehicles are not expected to noticeably increase the amount of odors associated with traffic along roads in the Project area.

When comparing Alternative D to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative D to the No-Action Alternative). Therefore, odor impacts of Alternative D associated with operational activities would result in a **less than significant** impact.

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5.0 Biological Resources – Fisheries

This section describes the fisheries within the Project area, including habitats, species, and special-status fish species. Section 5.1 describes the environmental setting and Project boundaries. Section 5.2 describes the regulations and local ordinances that would apply to aquatic wildlife resources. Section 5.3 discusses environmental consequences and mitigation measures, where needed.

5.1 Environmental Setting

The environmental setting focuses on Reach 2B, a section of the San Joaquin River which begins at the Chowchilla Bifurcation Structure and ends at Mendota Dam. The Project area also includes about 1,800 linear feet of river upstream of the Chowchilla Bifurcation Structure, about 1.7 miles of the river downstream of Mendota Dam, and a portion of Fresno Slough.

Existing conditions are defined as the conditions existing when the Notice of Intent and Notice of Preparation were filed, which was July 2009, prior to the start of Interim Flows. Several field efforts occurred at later dates, and therefore, the best available information to describe existing conditions also includes information from the period after the start of Interim Flows.

5.1.1 Aquatic Habitat

Mendota Pool is located at the confluence of Fresno Slough and the San Joaquin River. The San Joaquin River arm of Mendota Pool extends from Mendota Dam to San Mateo Avenue. San Mateo Avenue has a low-flow crossing consisting of a culvert and an earthen embankment supporting the roadbed which is overtopped during higher flows.

Water is typically delivered to Mendota Pool from the Delta-Mendota Canal (DMC) and is withdrawn at several canal or pump locations in the Pool including Columbia Canal, Helm Ditch, Main Canal, Outside Canal, Fresno County Waterworks District Canal, Mowry pumps, and others. Water is also delivered to the Pool by the Mendota Pool Pumpers group as well as by river flows. Mendota Pool has been dewatered biennially in mid-winter for inspections and maintenance of the dam, but some locations held standing water during this several week period. Although recent repairs at Mendota Dam have reduced the need to dewater the Pool for dam inspections, Mendota Pool was most recently dewatered for maintenance in the winter of 2011 to 2012.

Prior to the start of Interim Flows in October 2009, the section of Reach 2B between the Chowchilla Bifurcation Structure and San Mateo Avenue was mostly dry (San Joaquin River Restoration Program [SJRRP] 2010a). Surface flows throughout Reach 2B occurred during very wet periods (about every 3 to 5 years). Water released from

Mendota Dam was typically delivered to downstream water users. Downstream of the last diversion point, the river was typically dry.

Aquatic habitat in Reach 2B was either mostly absent within the dry section of the channel or was backwatered in the impounded water body. The river channel was composed of a sand bed with margins occupied by sparse riparian or ruderal vegetation (SJRRP 2010b). The portion of the Reach 2B channel upstream of San Mateo Avenue was composed of unconsolidated fine sand. Aquatic habitat was seasonal because flow was not sustained in the channel. The channel bed was generally devoid of a defined low-flow channel or aquatic habitat features such as pools and bars. Riparian vegetation was sparse and limited to the levees along the channel. Downstream of San Mateo Avenue, aquatic habitat was affected by the backwatering of Mendota Dam and sedimentation in Mendota Pool. The channel was defined by emergent, wetland, and riparian vegetation, including mature cottonwood trees, established along the backwatered portion of Mendota Pool. Most of the Pool was fairly shallow, and some areas also contained submerged aquatic vegetation. Mendota Pool contained mostly introduced fish and a few native fish.

Since the start of Interim Flows there have been some changes in Reach 2B, mostly between the Chowchilla Bifurcation Structure and San Mateo Avenue. The changes primarily consist of more regular inundation due to increased water releases from Friant Dam and the associated establishment of hydrophilic vegetation. Aquatic habitat includes a series of low gradient riffles, flatwater glides, and mid-channel pools (California Department of Fish and Wildlife [DFW] 2010). However, in dry years, portions of the channel still experience extended periods of desiccation. The section of Reach 2B affected by backwater is visibly unchanged by Interim Flows and generally persists as described above because it continues to have water year-round.

5.1.2 Aquatic Foodweb

The aquatic food web is poorly understood and documented in Reach 2B. However, what has been documented are modifications to habitat, introduction of nonnative species, water management activities, and alteration of water quality, which has substantially altered nutrient processing by the primary producers (diatoms and aquatic vegetation) and secondary producers (zooplankton and aquatic invertebrates), and has affected fish communities and other aquatic fauna (Brown 1996).

Food web processes in Reach 2B are influenced by invertebrate production within the reach and by the drift of benthic invertebrates into and out of the reach. The quantity of insects that would drift during times of flow into Reach 2B from upstream reaches is unknown. Reach 1 has gravel substrates and riffles which create productive habitat for benthic invertebrates, suggesting that many prey taxa are likely available for juvenile salmonids[1] (Stillwater Sciences 2003). While many of these taxa have high propensity to drift and are likely important components of fish diets, how far they drift and whether they would drift to locations downstream that do not retain gravel substrate (such as Reach 2B) is unknown. The amount of insect drift that enters Reach 2B would be

[1] Salmonids are those fishes from the *Salmonidae* family, such as salmon, trout, and char.

affected by flows directed into Chowchilla Bypass at the Chowchilla Bifurcation Structure. The amount of insect drift from Reach 2B to downstream reaches would be affected by the proportion of inflow that is exported out of Mendota Pool. Mendota Pool habitat and food web processes would also be affected by water that is imported through the DMC and groundwater inputs from the Mendota Pool Pumpers.

Floodplains that support riparian vegetation or grasslands that are seasonally inundated can also provide a source of nutrients and primary and secondary producers that can propagate to downstream channels, if not exported at on-river diversions. Floodplain habitats typically produce small invertebrates with short life cycles, such as chironomids and cladocerans (McBain and Trush 2002). The inundation timing, duration, and frequency of inundation influence invertebrate production and nutrient processing on floodplains (Ahearn et al. 2006; Grosholz and Gallo 2006). This resource availability, combined with warmer temperatures on the floodplains compared to main channel habitats, has been documented to accelerate juvenile salmonid growth in floodplain river systems (Jeffres et al. 2008). Under existing conditions, however, there is only the main river channel and very limited floodplain habitat is present between the existing levees in Reach 2B.

Invasive fish species may alter food webs and have adverse consequences to native fish species, including increased competition for resources, direct predation, and habitat or behavior interference (Moyle 2002). San Joaquin River non-native piscivores include largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), green sunfish (*Lepomis cyanellus*), warmouth (*Lepomis gulosus*), black crappie (*Pomoxis nigromaculatus*), striped bass (*Morone saxatilis*), brook trout (*Salvelinus fontinalis*), redear sunfish (*Lepomis microlophus*), spotted bass (*Micropterus punctulatus*), channel catfish (*Ictalurus punctatus*), and white catfish (*Ameiurus catus*). Because of their small size and weaker swimming abilities, larval and early life stages of fish are particularly vulnerable to predation. Imported water from the DMC is an ongoing source for some of these species. Millerton Reservoir and Fresno Slough can also be sources of nonnative fish species.

5.1.3 Aquatic Species Known to Occur in the Project Area and Vicinity

Table 5-1 provides a list of fish species captured and reported between Reaches 2A and 3. Many of these species were found in Mendota Pool.

Table 5-1.
Fish Species in the Vicinity of Reach 2B

Native Fish Species	
Hitch (*Lavinia exilicauda*) [*,1, 3]	Sacramento sucker (*Catostomus occidentalis*) [*,1, 2, 3]
Tule perch (*Hysterocarpus traskii*) [3]	Sacramento splittail (*Pogonichthys macrolepidotus*) [*, 2]
River lamprey (*Lampetra ayresi*) [3]	Prickly sculpin (*Cottus asper*) [2, 3]
Sacramento blackfish (*Orthodon microlepidotus*) [3]	Rainbow trout (*Oncorhynchus mykiss*) [2, 3]
Hardhead (*Mylopharodon conocephalus*) [3]	Sacramento pikeminnow (*Ptychocheilus grandis*) [2, 3]
Kern Brook lamprey (*Lampetra hubbsi*) [3]	Chinook salmon (*Oncorhynchus tshawytscha*) [2]

Table 5-1.
Fish Species in the Vicinity of Reach 2B

Pacific lamprey (*Lampetra tridentata*) [3]	Riffle sculpin (*Cottus gulosus*) [2]
Threespine stickleback (*Gasterosteus aculeatus*) [2, 3]	
Introduced Fish Species	
Threadfin shad (*Dorosoma petenense*) [*,1, 2, 3]	Black bullhead (*Ameiurus melas*) [*,1, 2, 3]
Black crappie (*Pomoxis nigromaculatus*) [*,1, 2, 3]	Largemouth bass (*Micropterus salmoides*) [*,1, 2, 3]
Inland silverside (*Menidia beryllina*) [*, 1, 2, 3]	White catfish (*Ameiurus catus*) [*,1, 2, 3]
Striped bass (*Morone saxatilis*) [*,1, 2, 3]	Pumpkinseed (*Lepomis gibbosus*) [*,1, 2, 3]
Channel catfish (*Ictalurus punctatus*) [*,1, 2, 3]	American shad (*Alosa sapidissima*) [*,1]
Bluegill (*Lepomis macrochirus*) [*,1, 2, 3]	Warmouth (*Lepomis gulosus*) [*,1, 2, 3]
White crappie (*Pomoxis annularis*) [*,1, 2, 3]	Golden shiner (*Notemigonus crysoleucas*) [*,1, 2, 3]
Goldfish (*Carassius auratus*) [*,1,2,3]	Brown bullhead (*Ameiurus nebulosus*) [*,1,2, 3]
Common carp (*Cyprinus carpio*) [*,1, 2, 3]	Western mosquitofish (*Gambusia affinis*) [*,1, 2, 3]
Green sunfish (*Lepomis cyanellus*) [*,1, 2, 3]	Bigscale logperch (*Percina macrolepida*) [*,1, 2, 3]
Redear sunfish (*Lepomis microlophus*) [*, 2, 3]	Red shiner (*Cyprinella letrensis*) [*, 2, 3]
Black bass spp. (*Micropterus spp.*) [*, 2]	Fathead minnow (*Pimephales promelas*) [*, 2, 3]
Spotted bass (*Micropterus punctulatus*) [*, 2, 3]	Yellow bullhead (*Ameiurus natalis*) [*, 2]
Shimofuri goby (*Tridentiger bifasciatus*) [*, 2, 3]	Weather loach (*Misgurnus anquillicaudatus*) [*]
Redeye bass (*Micropterus coosae*) [3]	

Notes:

* Fish species that are also found in Reaches 2A and/or 3

[1] Jones and Stokes 1986, Scientific and common names have been updated from Jones and Stokes (1986) to be consistent with current nomenclature (Nelson et al. 2004).

[2] Hutcherson 2013, unpublished data.

[3] Workman and Portz 2013.

Several fish surveys have been conducted in the San Joaquin River or in the major tributaries of the San Joaquin Valley. Jones and Stokes (1986) found two native fish species (hitch [*Lavinia exilicauda*] and Sacramento sucker [*Catostomus occidentalis*]) and 20 introduced species in Mendota Pool. Since the 1986 survey, additional introduced species have appeared in the Delta and are likely to have been transported to Mendota Pool causing species composition shifts. Previously unreported species were found during surveys of Reaches 1, 3, and 5 during 2004 and 2005. The number of species typically found increased with distance downstream from Friant Dam and the composition of fish assemblages shifted from native species to non-native species.

USFWS and Reclamation conducted comprehensive fish surveys in the San Joaquin River in 2012 and 2013, after the start of Interim Flows. These surveys have found previously unreported native and introduced fish species between Reach 2A and Reach 3. Native fish species captured include Pacific lamprey (*Lampetra tridentate*), prickly sculpin (*Cottus asper*), Sacramento splittail (*Pogonichthys macrolepidotus*), Sacramento blackfish (*Orthodon microlepidotus*), hardhead (*Mylopharodon conocephalus*), Kern Brook lamprey (*Lampetra hubbsi*), river lamprey (*Lampetra ayresi*), and tule perch

(*Hysterocarpus traskii*). Introduced species captured include redear sunfish, spotted bass, Shimofuri goby (*Tridentiger bifasciatus*), bigscale logperch (*Percina macrolepida*), redeye bass (*Micropterus coosae*), striped bass, red shiner (*Cyprinella letrensis*), fathead minnow (*Pimephales promelas*), and yellow bullhead (*Ameiurus natalis*) (Hutcherson 2013; Workman and Portz 2013). Pacific staghorn sculpin (*Leptocottus armatus*) and brook trout (*Salvelinus fontinalis*) have also been detected between Reach 2A and Reach 3. They were likely introduced as a result of the Delta-Mendota Canal and upstream hatcheries, respectively, but these species would be unable to complete their life cycle in Reach 2B and therefore should not be considered part of the Reach 2B fish community. Reaches 1 and 3 and Mendota Pool have likely been sources of fishes that colonize Reach 2B as flows have been restored to the San Joaquin River.

On October 6, 2014 during a 2014 fish sampling effort just upstream of the Chowchilla Bifurcation Structure in Reach 2A (River Mile 215 to 218), U.S. Fish and Wildlife Service (USFWS) captured a weather loach (*Misgurnus anquillicaudatus*), a previously undocumented nonnative species (SJRRP 2014; USFWS 2014). USFWS and CDFW conducted a more intensive fish sampling effort on November 12, 2014 (USFWS 2014). Six additional weather loaches were captured upstream of the structure while none were detected downstream of the structure. Possible negative effects of this species could include egg predation, competition, and pathogen transfer.

Fall-run Chinook salmon (*Oncorhynchus tshawytscha*) have occasionally been found moving into the San Joaquin River upstream of the Merced River (San Francisco Estuary Institute [SFEI] 2002). Although the Hills Ferry Barrier is seasonally installed to restrict movement of adult salmon into areas that presently do not provide access to spawning habitat, adult fall-run Chinook salmon have been observed upstream of the Hills Ferry Barrier and have been observed in wet years at the base of Mendota Dam (Portz et al. 2011).

Although anglers have reported catching 69 white sturgeon (*Acipenser transmontanus*) and one green sturgeon (*Acipenser medirostris*) downstream of the Project area between 2007 and 2012 (DFW 2012), there have been no documented capture of white or green sturgeon from Reach 2B. USFWS captured 28 subadult/adult white sturgeon from 2012 to 2013 and documented spawning at four locations between Vernalis and Grayson (Jackson and Van Eenennaam 2013), approximately 116 to 133 river miles downstream of Reach 2B.

5.1.4 Special Status Species

Based on records in the California Natural Diversity Database (CNDDB) (DFW 2015) and USFWS lists for the Bonita Ranch, Coit Ranch, Firebaugh, Firebaugh NE, Gravelly Ford, Jamesan, Mendota Dam, Poso Farm, and Tranquility U.S. Geological Survey (USGS) 7.5-minute quadrangles (USFWS 2015), three special-status fish species are discussed as to whether they are potentially present in the vicinity of Reach 2B (Table 5-2). Special-status fish species include those species that are Federally-listed, proposed for Federal listing, Federal candidate species, State listed, State fully protected species, or species of special concern.

Table 5-2.
Threatened or Endangered Fish Species, Associated Critical Habitat, or Essential Fish Habitat Considered as Potentially Occurring Within the Project Area

Scientific Name	Common Name	Status	Critical Habitat or Essential Fish Habitat in or near Project Area
Hypomesus transpacificus	Delta Smelt	SE, FT	No
Oncorhynchus mykiss	Central Valley steelhead	ST, FT	No
Oncorhynchus tshawytscha	Central Valley Fall-run and Late fall-run Chinook salmon	SSC	Yes, Essential Fish Habitat
Oncorhynchus tshawytscha	Central Valley Spring-run Chinook salmon[1]	FT	Yes, Essential Fish Habitat

Note:
[1] A nonessential experimental population of spring-run Chinook salmon was released into the Restoration Area in spring 2014. Members of the experimental population have special regulations written for them under Section 4(d).
Key:
FT = Federally Threatened
SE = State of California Endangered
ST = State of California Threatened
SSC = species of special concern

The Federal Endangered Species Act of 1973 (ESA) requires that USFWS and National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) designate critical habitat for the listed species they manage. Federal agencies are required to consider the potential effects of their actions, including permit approval or funding, on listed species and their critical habitat.[2] Critical habitat has been designated for Delta smelt (*Hypomesus transpacificus*) and Central Valley steelhead (*Oncorhynchus mykiss*), but it does not occur within the Project area.

Essential fish habitat (EFH) for Chinook salmon has been designated in the Sacramento and San Joaquin River basins, including the Project area and vicinity. EFH is defined as those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. Chinook salmon stocks with potential to occur in Reach 2B include Central Valley fall-run and late fall-run Chinook salmon and a nonessential experimental population of Central Valley spring-run Chinook salmon (Table 5-2). Federal fishery management plans identify EFH, as required by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). The Pacific Coast Salmon Fishery Management Plan (Pacific Fishery Management Council [PFMC] 2012) identifies and protects habitat for Pacific coast salmonid species. Although the Central Valley fall-run and late fall-run Chinook salmon are not considered threatened or endangered under the ESA, the habitat is protected as EFH under the MSFCMA.

[2] The ESA defines critical habitat as "the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species at the time it is listed that are determined by the Secretary of the Interior to be essential for the conservation of the species."

Delta Smelt

Species Description

Delta smelt are slender bodied fish about 2 to 3 inches long, in the Osmeridae family (smelts). The species is endemic to the Sacramento-San Joaquin Delta. Delta smelt are able to live in waters with a wide range of salinity and typically rear in shallow (< 10 feet), open waters of the estuary (Moyle 2002). They are mostly found within a salinity range of 2 to 7 parts per thousand and have been collected from the estuarine waters up to 14 parts per thousand. This species can be found in the Delta nearly year-round, with adults moving into the interior Delta before spawning, beginning in December. Spawning occurs from February through May with larval and juvenile fish developing during spring and summer.

USFWS has defined four constituent elements of delta smelt habitat, including: (1) shallow freshwater to slightly brackish sites for spawning; (2) protected channels and rivers to provide transport of larvae to downstream rearing sites; (3) estuary rearing habitat that provides a shallow, protective, food-rich environment; and (4) unrestricted access to spawning sites between December and July (USFWS 1994).

Known Occurrences

CNDDB describes no known occurrences within 10 miles of the Project footprint; in fact, the Project area is over 100 miles from the nearest occupied delta smelt habitat. Delta smelt have been found in the San Joaquin River as far upstream as Mossdale and above, but still within the legal boundaries of the Delta (over 100 river miles below Reach 2B). Delta smelt could be found in Mendota Pool since water from the Delta is pumped into the DMC, but the likelihood of delta smelt surviving the trip in the canal system is very low. Delta smelt reaching the Mendota Pool would be unlikely to survive because of unsuitable habitat that does not provide food resources that smelt depend on for survival and because of water temperatures would also be outside the optimal temperature range for delta smelt during late spring through summer. Potential Project-related flow volume, timing, or water quality changes from the San Joaquin River into the Delta that may affect delta smelt was addressed in the Program Environmental Impact Statement/Report (PEIS/R) (SJRRP 2011, pages 5-82 and 5-83). Based on the available data and existing habitat conditions, the potential for delta smelt to occur within the Project area is extremely low.

Central Valley Steelhead

Species Description

Central Valley steelhead Distinct Population Segment consists of naturally spawned anadromous populations of *O. mykiss* downstream of natural and man-made impassable barriers in the Sacramento and San Joaquin rivers and their tributaries. Steelhead can be divided into two life history types, winter (ocean-maturing) and summer (river-maturing), based on their sexual maturity at river entry and the duration of their spawning migration. Only winter run types are presently found within the Central Valley. Two artificial propagation programs are considered part of the Distinct Population Segment: the Coleman National Fish Hatchery and the Feather River Fish Hatchery steelhead hatchery

programs. The San Joaquin Hatchery, located downstream of Friant Dam, rears rainbow trout for planting into Reach 1 and other locations above Millerton Lake in Fresno and Madera counties. The hatchery operations and facilities would be modified as necessary to support restoring runs of salmon to the San Joaquin River (as a separate project with separate environmental compliance documentation).

Central Valley steelhead generally leave the ocean from August through April and move upstream into Central Valley rivers. Spawning takes place from December through April with a peak between January and March. Steelhead are iteroparous (i.e., capable of spawning more than once over several years), so post-spawn adults (i.e., kelts during this life stage) can return to the ocean where they will mature and possibly migrate inland to spawn again. Juvenile steelhead rear in cold water streams in riffles, runs, and pools. Most steelhead will rear for at least a full year before they begin migrating downstream to the ocean. Outmigration occurs when fish reach 6 to 8 inches in size and begin to transform from a resident juvenile form to a smolt. Outmigration can occur from fall through spring with a peak from February through April.

The NMFS has defined six constituent elements of Central Valley steelhead habitat, including: (1) freshwater spawning sites; (2) freshwater rearing sites with sufficient shade, foraging areas, and space for growth and movement; (3) freshwater migration corridors with sufficient areas of cover; (4) estuarine areas that provide areas for foraging and cover; (5) near shore marine areas that allow for juvenile transition from natal streams to offshore environments; and (6) off-shore marine areas with sufficient forage (NMFS 2005).

Known Occurrences

Steelhead or resident rainbow trout have been captured in the three main tributaries of the San Joaquin River including the Stanislaus, Tuolumne and Merced rivers. They are not known to occur in Reach 5 or upstream within the San Joaquin River (Eilers et al. 2010). Since steelhead require year round habitat for juvenile rearing they would not be present in the typically dry sections of Reach 2B. It is possible, but highly unlikely that juvenile steelhead would be present in the Mendota Pool because water from the Delta is delivered to the pool via the DMC. These fish would have had to successfully be passed through Tracy Fish Collection Facility lift pumps and transit through a canal system full of predators. Aquatic habitat in Mendota Pool is unsuitable for steelhead during the warm summer months.

Based on the occurrence data and available information, there is extremely low potential for Central Valley steelhead to be present within the Project area under existing conditions. As flows are restored to the San Joaquin River and fish passage is provided it is likely that steelhead may move upstream and occupy Reach 2B seasonally during times of the year when water temperatures and habitat are suitable. For example, steelhead could reside year round in Reach 1 or use Reach 2B as a migration corridor if they become established in the San Joaquin River.

Central Valley Fall-Run Chinook Salmon

Species Description

Central Valley fall-run Chinook salmon occur in the Sacramento River and its tributaries; the Delta and Suisun Marsh; and the San Joaquin River and five of its east-side tributaries, including the Merced, Tuolumne, Stanislaus, Mokelumne, and Cosumnes rivers. The Central Valley evolutionarily significant unit (ESU) is considered the southernmost native spawning population of Chinook salmon. Fall-run Chinook are currently the most numerous of the Central Valley runs and the only race that regularly spawns in the San Joaquin basin (NMFS 2008).

Fall-run are ocean-type Chinook that tend to enter freshwater as fully mature fish, migrate to lowland reaches of large rivers and tributaries, and spawn within a few days or weeks of arriving on the spawning grounds. Currently, adult fall-run salmon in the San Joaquin River basin typically migrate upstream between mid-September and early December, and spawn between late October and early December in tributaries of the Sacramento and San Joaquin basins (Moyle 2002). Fall-run Chinook salmon typically rear in freshwater for 1 to 3 months before outmigrating to the ocean, but some may disperse downstream as fry soon after emerging from the streambed. Life history requirements for adult and juvenile Chinook salmon are more fully described in the SJRRP *Fisheries Management Plan* (SJRRP 2010c).

Known Occurrences

Fall-run Chinook salmon occur in the Stanislaus, Tuolumne, and Merced Rivers, but no longer occur within the Project area. Historically, the San Joaquin River likely supported relatively few fall-run Chinook salmon after diversions began at Sack Dam, sometime between 1860 and 1880. During all but wet years, the river was nearly completely dewatered downstream from Sack Dam until late November, by which time it was too late for most fall-run Chinook salmon to migrate upstream in the San Joaquin River Basin (SJRRP 2010c). Fall-run Chinook salmon likely used the San Joaquin River system only when flows were sufficient for upstream passage during the fall.

More recently, Chinook salmon have been found in the San Joaquin River in the vicinity of Mud Slough and the confluence of the Merced River. From 2001 to 2009, two adult Chinook salmon were collected from the San Joaquin River in the vicinity of the Merced River; one was collected at Fremont Ford on December 3, 2003, and the other was collected at Hills Ferry, below Mud Slough, on December 5, 2007 (SFEI 2002). An older report from the Grasslands Bypass program covering the period from 1993 to 2002 is referenced in the 2001 to 2002 report; it notes that 26 Chinook salmon were collected, but the data to support these claims were not verifiable (Eacock, pers. comm., 2011).

During the fall of 2010, after large, early storms damaged the Hills Ferry Barrier and allowed salmon to move above the barrier for several days, multiple adult Chinook salmon were observed by DFW biologists below Sack Dam between November 16 and 18, and below Mendota Dam between November 22 and December 8 (Guzman, pers. comm., 2011).

Based on the occurrence data and available information, fall-run Chinook salmon have not typically been present within the Project area prior to SJRRP restoration activities.

The SJRRP has been releasing fall-run Chinook salmon to the San Joaquin River since 2010 to study juvenile outmigration. Beginning in 2012, adult fall-run have been captured above the Hills Ferry Barrier and transported to Reach 1, to either spawn naturally or be spawned artificially, their progeny outmigrating the following winter/spring.

When fish passage and sufficient flows are provided to Sack Dam in Arroyo Canal located in Reach 3, adult fall-run Chinook salmon could migrate upstream through Reach 2B from October through December, and juvenile fish released in Reach 1 could use Reach 2B for migrant rearing from February through May. These young-of-the-year fish would occur in Reach 2B as transient juveniles as they migrate downstream toward the ocean (Stillwater Sciences 2003).

Central Valley Spring-Run Chinook Salmon

Species Description

The Central Valley spring-run Chinook salmon ESU consists primarily of three populations in three tributary systems (Mill, Deer, and Butte creeks), as well as Feather River and Clear Creek, which are all located within the Sacramento River basin. Recent reintroductions have also established a run in Battle Creek. The population uses rearing and migration habitats in the Sacramento River basin and Delta, San Francisco Bay, and offshore ocean waters.

Historically, spring-run salmon in the San Joaquin River migrated upstream between April and early July, with most adults migrating upstream in May and June. Currently, there is no population of spring-run salmon in the San Joaquin River basin.

Spring-run Chinook salmon tend to enter freshwater as immature fish, migrate far upriver, and delay spawning for weeks or months (stream-type life history) (West Coast Chinook Salmon Biological Review Team [WCCSBRT] 1997). Spawning occurs in Sacramento River tributaries from late September through mid-November. Fry emerge from the gravel from November to March and spend about 3 to 15 months in freshwater habitats prior to emigrating to the ocean. Spring-run Chinook salmon generally mature between 2 and 4 years of age.

In addition to rearing in natal streams, spring-run Chinook salmon juveniles rear in the lower part of nonnatal tributaries and intermittent streams during the winter months (Maslin et al. 1997). Emigration can be highly variable. Some juveniles may begin outmigrating soon after emergence, whereas others over-summer and emigrate as yearlings with the onset of intense fall storms (DFW 1998). The emigration period for spring-run Chinook salmon extends from November to early May. Emigration appears to coincide with high precipitation and high Sacramento River flows.

NMFS designated critical habitat for spawning and rearing Central Valley spring-run Chinook salmon in the Sacramento River and specific tributaries, as well as in the Sacramento Delta Hydrologic Unit within the Sacramento-San Joaquin Delta.

Known Occurrences

Spring-run Chinook salmon no longer occur within the Project area. Historically, spring-run Chinook salmon spawned in the San Joaquin River from about the present day location of Friant Dam to as far upstream as Mammoth Pool (River Mile 322) (McBain and Trush 2002). During the late 1930s and early 1940s, as Friant Dam was being constructed, large runs continued to return to the river. After the dam was completed and the reservoir was filling, runs of 30,000 to 50,000 fish continued to return and spawn in the river downstream of Friant Dam. These runs were completely gone by 1950, as diversions from Friant Dam resulted in the river being dry at Gravelly Ford (McBain and Trush 2002).

There have been reports of Chinook salmon with spring-run-like life histories from tributaries of the San Joaquin River and Delta, specifically in the Stanislaus and Mokelumne rivers. Snorkel surveys in the Stanislaus River in the mid-2000s and netting surveys in the early 2000s resulted in observation or capture of adult Chinook salmon from the Stanislaus River in mid-summer (Wikert, pers. comm., 2011). There are reports that adult Chinook salmon exhibiting traits similar to spring-run Chinook have been counted in the Woodbridge Dam fish ladder by the East Bay Municipal Utility District (Wikert, pers. comm., 2011).

Based on the occurrence data and available information, spring-run Chinook salmon were not recently present within the Project area prior to SJRRP restoration activities.

Juvenile spring-run Chinook salmon, as part of an experimental population, were released into the Restoration Area in spring 2014 and spring 2015. This action as well as all other Chinook salmon reintroduction actions are analyzed under separate environmental documentation. If successful migration, holding, and spawning occurs, juvenile fish could be found using Reach 2B for migrant rearing from November through May. When migration flows are restored to the San Joaquin River and fish passage is provided, adult spring-run Chinook salmon from other rivers in the Central Valley may stray into the San Joaquin River during winter or spring.

5.2 Regulatory Setting

The Federal, State, and local laws and regulations applicable to fisheries in the Project area are described below.

5.2.1 Federal

The following subsections describe Federal laws and regulations governing the protection of fisheries resources.

Clean Water Act Sections 401 and 404

(See Chapter 14.0, “Hydrology - Surface Water Resources and Water Quality.”)

Rivers and Harbors Act Section 10

(See Chapter 14.0, “Hydrology - Surface Water Resources and Water Quality.”)

Federal Endangered Species Act of 1973 (16 United States Code [USC] Section 1531 et seq., 50 Code of Federal Regulations [CFR] Parts 17 and 222)

The ESA includes provisions for protection and management of species that are Federally-listed as threatened or endangered and designates critical habitat for these species. This law prohibits "take" of Federally-listed species, except as authorized under an incidental take permit or incidental take statement. USFWS is the administering agency for this authority for freshwater species. NMFS is the administering agency for anadromous species.

Section 4(d) of the Act allows USFWS or NMFS to establish special regulations for threatened species, subspecies, and Distinct Population Segments. These "4(d) rules" may either increase or decrease ESA's normal protections. One use of 4(d) rules is to relax normal ESA restrictions to reduce conflicts between people and the protections provided to the threatened species. This may occur in situations where conflicts would adversely affect recovery and the reduced protection would not slow the species' recovery.

Section 10(j) of the Act provides for the designation of specific reintroduced populations of listed species as "experimental populations." An experimental population is a geographically described group of reintroduced plants or animals that is isolated from other existing populations of the species. Members of the experimental population are considered to be threatened under ESA, and can have special regulations written for them under Section 4(d).

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) (16 USC 661 et seq.) amended 1946, 1958, 1978, and 1995 requires Federal agencies to coordinate with USFWS, or, in some instances, with NMFS, and with State fish and wildlife resource agencies before undertaking or approving water projects that control or modify surface water. The purpose of this coordination is to ensure that wildlife resources held in public trust receive appropriate consideration and be coordinated with the features of these water resource development projects. Federal agencies undertaking water projects are required to fully consider recommendations made by USFWS, NMFS, and State fish and wildlife resource agencies in project reports, such as documents prepared to comply with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), and to include measures to reduce impacts on wildlife in project plans.

Magnuson-Stevens Fishery Conservation and Management Act 1996 (Public Law 94-265)

This law provides for the conservation and management of all fish resources within the exclusive economic zone of the U.S. and supports and encourages the implementation and enforcement of international fisheries agreements for the conservation and management of highly migratory species. It called for the establishment of Regional Fisheries Management Councils to develop, implement, monitor, and revise fish management plans to promote domestic commercial and recreational fishing. Specifically to the SJRRP, it calls for the protection of EFH in review of projects conducted under Federal permits, licenses, or other authorities that affect or have the potential to affect such habitat. NMFS is responsible for the administration of this act.

Central Valley Project Improvement Act

Implementation of the Central Valley Project Improvement Act (CVPIA) changed management of the Central Valley Project (CVP) by making fish and wildlife protection a project purpose, equal to water supply for agricultural and urban uses. The CVPIA affects water exports from the Delta to San Luis Reservoir and increases operational pressures on the reservoir to meet south-of-Delta water demands. CVPIA Section 3406 (b)(2) authorized and directed the Secretary of the Interior, among other actions, to dedicate and manage 800 thousand acre-feet (TAF) of CVP yield annually for the primary purpose of implementing the fish, wildlife, and habitat restoration purposes and measures authorized in the CVPIA; assist the State in its efforts to protect the waters of the San Francisco Bay-Delta Estuary; and help meet obligations legally imposed on the CVP under Federal or State law following the date of enactment of the CVPIA. CVPIA Section 3406(d)(1) required that the Secretary of the Interior immediately provide specific quantities of water to the refuges, referred to as "Level 2" supplies. The CVPIA requires delivery of Level 2 water in all year–types except critically dry water year conditions, when Level 2 water can be reduced by 25 percent. Section 3406(d)(2) of the CVPIA refers to "Level 4" refuge water supplies, which are the quantities required for optimum habitat management of the existing refuge lands. Level 4 water supplies amount to about 163 TAF above Level 2 water supplies. The availability of Level 4 refuge water supplies is influenced by the availability of water for transfer from willing sellers. CVPIA Section 3406(c)(1) mandated development of a comprehensive plan that is reasonably prudent and feasible to be presented to Congress to address fish, wildlife, and habitat concerns on the San Joaquin River. However, Public Law 111-11 declared "that the Settlement satisfies and discharges all of the obligations of the Secretary contained in section 3406(c)(1)."

5.2.2 State of California

California Water Code

The California Water Code authorizes the State Water Resources Control Board (SWRCB) to allocate surface water rights and permit diversion and use of water throughout the State. SWRCB considers effects on fisheries as part of its permitting process. Division 7 of the California Water Code, known as the Porter-Cologne Water Quality Control Act, regulates activities that affect water quality.

California Fish and Game Code section 1600 et seq.

This law provides for the protection and conservation of fish and wildlife resources with respect to any project that may substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake. The administering agency is the DFW.

California Endangered Species Act of 1984 (Fish & G. Code, §§ 2050-2098)

This law provides for the protection and management of species and subspecies listed by the State as endangered or threatened, or designated as candidates for such listing. They are listed at California Code of Regulations, Title 14, section 670.5. This law prohibits "take" of state-listed or candidate species, except as otherwise authorized by the Fish and Game Code. The term "take" is defined by Fish and Game Code section 86 as "hunt,

pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." This definition is different in some respects from the definition of "take" under the ESA. The administering agency is the DFW.

Sufficient Water for Fish Below Dams (Fish & G. Code, § 5937)

This law requires that an owner or operator of a dam allow sufficient water to pass through a fishway, or, in the absence of a fishway, allow sufficient water to pass over, around, or through the dam to keep fish in good condition, whether they are planted or exist below the dam. This law provides exceptions for the owner/operator to pass water through a culvert or waste gate during low flow years when the DFW determines that it is infeasible to pass water through a fishway.

California Freshwater Sport Fishing Regulations 2014-2015, effective March 1, 2014

Fishing gear, methods, limits and the kinds of fish allowed for sport harvest are defined in California Sport Fishing Regulations and are updated by recommendations made by the Fish and Game Commission to the DFW. These regulations (identified in Cal. Code Regs. tit. 14) are enforced by DFW in the field. The regulations cover activities allowed under a sport fishing license by fishing districts and are used to manage the harvest of game fish under General Regulations.

Trout, Salmon and Special Regulations, District General Regulations (Cal. Code Regs., tit. 14., ch. 3, art. 2, §7)

The fishing regulations define which waters and when those waters are open and closed to trout and salmon fishing. The regulations further describe gear restrictions, which other species may be taken, and daily bag and possession limits for each species. In waters where the bag limit for trout or salmon is zero, fish must be released unharmed and should not be removed from the water. The following regulations are applicable to the Valley District.

- All lakes and reservoirs except those listed by name in the Special Regulations. Season – All Year. Bag Limit: five.
- All anadromous waters except those listed by name in the Special Regulations. Season – All Year. Bag Limit: two hatchery trout or hatchery steelhead (four hatchery trout or hatchery steelhead in possession). Closed to the take of salmon.
- San Joaquin River from Friant Dam downstream to the Highway 140 bridge. Season – All Year. Bag Limit: two hatchery trout or hatchery steelhead (four hatchery trout or hatchery steelhead in possession).

Reach 2B is in the Valley District and is an anadromous waterbody. [3] Under existing fishing regulations, Valley District anadromous waters are closed to salmon fishing (i.e., no take or possession of salmon).

[3] Anadromous waters are inland waters that are accessible to fish migrating from the ocean.

Taking Fish near Dams, Fishways, Screens and Egg-Taking Stations (Cal. Code Regs., tit. 14., ch. 3, art. 2, § 2.35)

The fishing regulations also define fishing methods and gear restrictions that may be applicable to conditions found in all fishing districts. A regulation that restricts fishing from dams or fishways would be application to Reach 2B. No fish may be taken within 250 feet of:

- Any fishway or any egg-taking station.
- Any dam or any weir or rack which has a fishway or an egg-taking station.
- The upstream side of any fish screen.

Fish may be taken upstream or downstream from any dam that does not have a fishway or egg-taking station (this supersedes Fish & G. Code, § 5502).

5.2.3 Regional and Local

Fresno County Plans and Ordinances

County ordinances directed at maintaining safety for boating and reducing risks from people attempting to swim from, use or fish off of bridges or water control structures include the following:

- **13.32.041 - Restricted areas for mooring, fishing or operating a vessel or watercraft in an area designated by a regulation marker.** It is unlawful for any person or persons to moor, fish or operate any vessel or watercraft in an area in a lake, river or other body of water designated by a regulation marker placed in the water by any public agency to restrict or control the area designated.
- **13.32.055 - Bridge or water control structure—Certain acts upon prohibited.** It is unlawful to loiter upon, fish upon, or jump from any bridge or water control structure that crosses any river, lake, or canal in the County of Fresno. As used in this section, "water control structure" includes any dams, weirs, control gates or headgates that are used for controlling or diverting the water flow on the various waterways in the County of Fresno.

Madera County Plans and Ordinances

County General Plan policies are directed at maintaining recreational and natural resources within the county. Madera County ordinances are directed at maintaining safety for boating and reducing risks from people swimming in waters where motorized boating occurs. There are no county ordinances covering activities in the San Joaquin River. General Plan policies under Section 5, Agricultural and Natural Resources, include:

- Policy 5.C.8. The County shall support the policies of the San Joaquin River Parkway Plan to protect the San Joaquin River as an aquatic habitat and water source.
- Policy 5.E.7. The County shall support the preservation and reestablishment of fisheries in the rivers and streams within the county, whenever possible.

5.3 Environmental Consequences and Mitigation Measures

5.3.1 Impact Assessment Methodology

This section describes the impact assessment methodology for fisheries resources in the Project area. The qualitative impact assessment relied upon knowledge of aquatic resource habitat requirements and expected changes to habitat or populations under the Project alternatives.

The *Fisheries Management Plan* (SJRRP 2010c) describes how the SJRRP would adaptively manage efforts to restore and maintain naturally reproducing and self-sustaining populations of Chinook salmon and other fish in the Restoration Area. A key objective of the Project would be to support restoring and maintaining populations of salmon and other fish in the San Joaquin River by increasing flow capacity and providing habitat in Reach 2B, a portion of which has been mostly dry prior to implementation of the Interim Flows. There is no spawning habitat contained within Reach 2B. Juvenile rearing habitat would occur during the outmigration period only.

The assessment of effects on fisheries is based on changes to habitat conditions in the channel and on the floodplain compared to existing conditions and the No-Action Alternative. The assessment also includes an evaluation of fish passage conditions at proposed facilities and an evaluation of fish entrainment at proposed screening systems. Fish passage and screening facilities were evaluated with respect to the risk in creating potential predator sites for target species. The assessment includes effects of proposed construction activities and operations on fish species compared to existing conditions and the No-Action Alternative.

Channel Habitat

Channel habitat conditions in Reach 2B are linked to features such as pools, bars, and the amount of bordering riparian habitat. These conditions would be expected to change somewhat in the Reach 2B upstream of Mendota Pool; however, the amount and nature of the habitat change are not quantifiable. Channel habitat was evaluated by comparing the relative amount of levee disturbance and channel and floodplain connection for each Project alternative.

Floodplain Habitat

Floodplain habitat for rearing juvenile fish was assessed by evaluating the amount of direct and indirect rearing habitat for the Project alternatives. For the purpose of this analysis, direct rearing habitat is defined as acres of floodplain with a depth greater than 1.0 feet at 2,500 cubic feet per second (cfs), while indirect rearing habitat is defined as the acres of floodplain with a depth less than 1.0 feet at 2,500 cfs. [4] Indirect rearing habitat was evaluated as a proportion of the amount of very shallow water habitat to the amount of rearing habitat.

[4] Direct rearing habitat refers to the habitat areas that fish physically occupy for rearing. Indirect rearing habitat refers to the habitat areas that fish do not physically occupy, but that do provide food and nutrient resources used by rearing fish. Indirect rearing habitat is also known as primary production habitat.

Fish Passage

Fish passage facilities would be provided at existing or proposed structures that would otherwise prevent or impede up- and down-stream passage of migratory salmon and other native fishes. The fish passage assessment assumed that all proposed structures would meet fish passage criteria established by fisheries agencies (see Section 2.2.4); as a result, the impact assessment is qualitative and based on the total number of artificial structures in the migratory pathway. Each structure, whether it is a dam sill, fish ladder (or bifurcation structure), or road crossing, is counted as an individual structure. The total number of steps at structures, such as the number of steps an adult or juvenile salmon would need to jump or swim through was also evaluated.

Risk of Entrainment

Active water diversions within Reach 2B would be screened to prevent fish entrainment by screening fish from Mendota Pool, consolidating diversions, or installing individual screens on some smaller diversions. Even though the diversions would be screened, the type of screen and the size of the diversion can present some risk to out-migrating juvenile salmon or other juvenile native fishes. The risk of entrainment was evaluated by comparing the number of screens along Reach 2B that juvenile fish may encounter as they transit the reach.

Risk of Predation

Potential predation sites can develop along fish screens, at the entrance or exit of fish ladders or in association with bifurcation structures or road crossings. Potential predation sites could harbor predatory fish such as largemouth bass, smallmouth bass, Sacramento pikeminnow, striped bass, or other species. These species would be attracted to scour holes below artificial structures, or structures that create shear zones where areas of turbulent high velocity water are in close proximity to low-velocity water that would favor the feeding of opportunistic predators. The number of potential predation sites associated with structures for the Project alternatives was evaluated.

5.3.2 Significance Criteria

Significance criteria were developed based on applicable regulations and management policies, a review of the available information, and the professional judgment of the authors. The project would have a significant effect on aquatic resources if it will:

- Cause a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status fish species in local or regional plans, policies, or regulations, or by the DFW, NMFS, or USFWS.
- Interfere substantially with the movement of any native resident or migratory fish or impede the use of native fish nursery sites.
- Conflict with any local policies or ordinances protecting biological resources.
- Conflict with the provisions of an adopted or approved habitat conservation plan, or Natural Community Conservation Plan.

In addition to the thresholds of significance for impacts in the Environmental Checklist Form in Appendix G of the State CEQA Guidelines, as amended, thresholds also encompass factors taken into account under NEPA to determine the significance of an action in terms of its context and the intensity of its effects. Impacts to fish would also be considered significant if implementation, operation, or maintenance of actions included in the Project alternatives would do any of the following:

- Cause production and/or discharge of materials that pose a hazard to fish.
- Result in displacement of spawning fish such that year-class strength of any Federal or State special-status fish species or any commercially important fish species is substantially reduced.
- Substantially reduce the abundance, either directly or by reducing the amount or quality of habitat, of any life stage of a Federal or State special-status fish species or any commercially important fish species.
- Adversely modify designated critical habitat for any Federally-listed species.

5.3.3 Impacts and Mitigation Measures

There are nine impact topics selected to answer the questions above on substantial direct or indirect effects to special status, native resident, or migratory fish and their habitats:

1. Effects on Fish Habitat and Passage for Local Fish Populations
2. Effects on Salmonid Rearing Habitat
3. Effects on Upstream Migration of Adult Salmonids
4. Effects on Downstream Migration of Juvenile Salmonids
5. Effects of In-channel Construction Activities on Fish Species within Reach 2B
6. Effects of Floodplain Use by Agriculture on Fish Species within Reach 2B
7. Effects on Occurrence of Native Fish Species within Reach 2B
8. Effects on Predation of Juvenile Salmonids and Native Fish Species
9. Effects on the Aquatic Food Web within Reach 2B

Other fisheries-related issues covered in the PEIS/R are not covered here because they are programmatic in nature and/or are not relevant to the Project area.

Issues Eliminated from Further Analysis

Habitat Conservation Plans and Other Conservation Plans. Aside from the Pacific Coast Salmon Fishery Management Plan, there are no adopted habitat conservation plans, Natural Communities Conservation Plan, or other approved State, regional, or local habitat conservation plans in the Project area. Project activities would not conflict with the provisions of any such plans; therefore, this issue is not further addressed in this section.

Other Local and Regional Plans. The Fresno County General Plan and the Madera County General Plan are described under Regulatory Setting in Section 5.2.3, Regional and Local. The policies identified in these plans to protect biological resources are

consistent with requirements of other State and Federal regulations. Project activities would not conflict with these policies; therefore, local and regional plans are not further addressed in this section.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the SJRRP would be implemented, including habitat restoration, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these activities would be unlikely to achieve the Settlement goals. The potential effects of the No-Action Alternative are described below. The analysis is a comparison to existing conditions, and no mitigation is required for No-Action.

Under the No-Action Alternative, salmon would be reintroduced into the San Joaquin River as part of the Program. Downstream migrating juveniles would be entrained in diversions from Mendota Pool each spring during their outmigration. Adult salmon would be blocked on their upstream migration at Mendota Dam in all years except wet year types unless trapped and moved upstream of migration barriers in Reach 2B. Blocked adult salmon would potentially be exposed to poaching in the river below Mendota Dam and/or poor water quality later in the year. There is no spawning substrate in Reach 3, downstream of the dam, so blocked adult fish would not spawn successfully unless they were physically trapped and moved upstream of Mendota Dam.

Impact AQUA-1 (No-Action Alternative): ***Effects on Fish Habitat and Passage for Local Fish Populations.*** Under the No-Action Alternative, the Project would not be implemented and there would be no increase in flow capacity in Reach 2B, Mendota Pool bypass, no fish passage structures, no screens installed on water diversions, and no improvements to San Mateo Avenue crossing. Restoration Flows would occur below Friant Dam to the Merced River, but be limited to than-existing channel capacities. In the context of the Project area, Restoration Flows would provide benefits from the Chowchilla Bifurcation Structure to Mendota Pool by wetting the channel upstream of Mendota Pool and through more frequent and longer duration flows than those that occur under existing conditions. In addition to benefits attributed to the fish population in Reach 2B, Restoration Flows would have benefits throughout the Program area. Compared to existing conditions, the No-Action Alternative would have a **beneficial** effect on fisheries associated with increased flows in the San Joaquin River but would not fully meet the Project purpose and need or achieve the Settlement goals.

Impact AQUA-2 (No-Action Alternative): ***Effects on Salmonid Rearing Habitat.*** Under the No-Action Alternative, none of the proposed fish passage or protection facilities or floodplain habitat associated with setback levees within the Project area would be implemented. As described above, however, rearing habitat conditions would be enhanced from Restoration Flows in the Project area within the existing channel. Restoration Flows would wet an otherwise dry channel upstream of Mendota Pool and seasonal flows would substantially inundate the channel more frequently. Compared to existing conditions, the No-Action Alternative would have a **beneficial** effect on juvenile

salmonid rearing habitat associated with increased flows in the San Joaquin River but would not fully meet the Project purpose and need or achieve the Settlement goals.

Impact AQUA-3 (No-Action Alternative): *Effects on Upstream Migration of Adult Salmonids.* Under the No-Action Alternative, fish passage facilities for upstream migration would not be implemented for the Project, but Restoration Flows would occur below Friant Dam to the Merced River. As part of the Program, other impediments to upstream migrating salmon would be modified to facilitate passage (e.g., Hills Ferry Barrier, Sack Dam). Under the No-Action Alternative, adult salmon likely would be trapped and moved upstream of migration barriers in Reach 2B as a Program action. Trapping and transporting adult Chinook salmon presents physiological stress for the fish that could result in reduced physical condition, injury, or in some cases, mortality. However, transporting Chinook salmon around barriers to access suitable spawning grounds would still have a beneficial effect, since fish downstream of barriers are not likely to find suitable spawning habitat. Compared to existing conditions, the No-Action Alternative would have a **beneficial** effect on upstream passage of adult salmon through trap and transport implemented by the Program but would not fully meet the Project purpose and need or achieve the Settlement goals.

Impact AQUA-4 (No-Action Alternative): *Effects on Downstream Migration of Juvenile Salmonids.* Under the No-Action Alternative, facilities associated with the Project would not be implemented, but Restoration Flows would occur below Friant Dam to the Merced River. Under existing conditions, the section of Reach 2B between the Chowchilla Bifurcation structure and San Mateo Avenue is often dry during the outmigration season. Under the No-Action Alternative, Restoration Flows would provide contiguous habitat connectivity from Friant Dam to the Merced River during typical outmigration periods for salmon and steelhead. Under the No-Action Alternative, juvenile salmon would migrate downstream through Reach 2B and would be exposed to several large, medium, and small unscreened diversions between the Chowchilla Bifurcation Structure and Mendota Dam. Although the flows and increased habitat connectivity would be an improvement over the dry conditions that typify existing conditions, without appropriately screened pumps and diversion structures juveniles would be subjected to high mortality rates as they encounter false migration pathways (i.e., canals and diversions) and experience mortality in pumps. Compared to existing conditions, the No-Action Alternative would have a **beneficial** effect on downstream migration of salmonid species but would not fully meet the Project purpose and need or achieve the Settlement goals.

Impact AQUA-5 (No-Action Alternative): *Effects of In-channel Construction Activities on Fish Species within Reach 2B*. Under the No-Action Alternative, no construction activity would occur in the active channel and there would be no adverse effects on aquatic species associated with construction-related crushing, disturbance, release of sediment, or release of pollutants from equipment operation and ground disturbance activities. Under the No-Action Alternative, the Project would not be implemented and there would be no Project-related short-term construction activities in the Project area. As a result, there would be **no impact** on existing aquatic resources within Reach 2B.

Impact AQUA-6 (No-Action Alternative): ***Effects of Floodplain Use by Agriculture on Fish Species within Reach 2B.*** Existing levees are not set back from the river channel. No agricultural practices presently occur within the existing levees. Under the No-Action Alternative, the Project would not be implemented and there would be no levee set-back and no agricultural use of lands within the existing levees. Compared to existing conditions, there would be **no impact** to fish species.

Impact AQUA-7 (No-Action Alternative): ***Effects on Occurrence of Native Fish Species within Reach 2B.*** Under the No-Action Alternative, the Project would not be implemented and no fish passage or screening facilities would be constructed and no channel improvements would occur. Restoration Flows would occur below Friant Dam to the Merced River. In addition to benefits attributed to the fish population in Reach 2B, Restoration Flows would have benefits throughout the Program area. In the context of the Project area, Restoration Flows within the existing channel capacity would provide benefits from the Chowchilla Bifurcation Structure to Mendota Pool by wetting the channel upstream of Mendota Pool and through more frequent and longer duration flows than those that occur under existing conditions. Compared to existing conditions, the No-Action Alternative would have a **beneficial** effect on native fishes associated with increased flows in the San Joaquin River but would not fully meet the Project purpose and need or achieve the Settlement goals.

Impact AQUA-8 (No-Action Alternative): ***Effects on Predation of Juvenile Salmonids and Native Fish Species.*** Restoration Flows could alter the presence and distribution of non-native predatory fish within Reach 2B. Under the No-Action Alternative, the Project would not be implemented, and no fish passage or screening facilities would be constructed and no channel improvements would occur. Restoration Flows would occur below Friant Dam to the Merced River. In addition to benefits attributed to the fish population in Reach 2B, Restoration Flows would have benefits throughout the Program area and would provide predator fish with better habitat conditions as well. In the context of the Project area, Restoration Flows would provide more opportunities for predators to move into Reach 2B, but would also provide improved habitat for native fishes. Prior to Interim Flows, habitat in Reach 2B was only marginally suitable for native fishes and supported more nonnative fishes than natives; however, increased flow would likely improve native habitat, allow native fishes to multiply in the reach, and increase the proportion of native fishes in Reach 2B. Because the proportion of native fishes is likely to increase as compared to non-native fishes, effects from predation would be reduced, and therefore the No-Action Alternative would have a **beneficial** effect on native fishes as compared to existing conditions.

Impact AQUA-9 (No-Action Alternative): ***Effects on the Aquatic Food Web within Reach 2B.*** Under the No-Action Alternative, the Project would not be implemented, but Restoration Flows would occur below Friant Dam to the Merced River. Levees would not be set back, but channel areas that are typically dry under existing conditions would be inundated under Restoration Flows, which would potentially create conditions for primary and secondary production which would otherwise not occur. Also, as noted in Impact AQUA-4 (No-Action Alternative), Restoration Flows would provide near contiguous habitat connectivity from Friant Dam to the Merced River, which would

potentially bring nutrients and insects from upstream reaches that have different environmental conditions (e.g., gravel in Reach 1) and different insect drift components than found in Reach 2B (e.g., greater proportion of macroinvertebrates). Compared to existing conditions, the inundation of additional existing channel areas under the No-Action Alternative would have a **beneficial** effect on the aquatic food web but would not fully meet the Project purpose and need or achieve the Settlement goals.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Under Alternative A, construction of new Project facilities would occur, including a new levee system capable of conveying flows up to 4,500 cfs with 3 feet of freeboard; the Compact Bypass capable of conveying Restoration Flows up to 4,500 cfs around Mendota Pool and Dam; and 10 to 18 grade control structures to aid in upstream passage of adult salmon and other native fishes. A fish guidance barrier would be installed in the San Joaquin River where the Compact Bypass joins the river in Reach 3 to direct upstream adult salmon into the bypass. The Mendota Pool Dike would be constructed across the existing San Joaquin River arm of Mendota Pool to isolate the Mendota Pool from the San Joaquin River and direct flows into the Compact Bypass. The San Mateo Avenue Crossing would be improved. The crossing would accommodate the increased flows in the river by maintaining the required velocities for proper fish passage for flows up to 4,500 cfs. Alternative A includes construction of the South Canal with a bifurcation structure that would provide up to 2,500 cfs diversion into the South Canal and up to 4,500 cfs to the San Joaquin River. The South Canal intake would include a NMFS-compliant fish screen capable of screening juvenile salmon up to flows of 2,500 cfs with a fish return system that would convey screened fish back to the river. An upstream fish passage facility would be constructed at the South Canal bifurcation structure to provide upstream passage when operations prevent passage through the structure. The existing San Joaquin River control structure of the Chowchilla Bifurcation Structure would be removed.

Alternative A would include three upstream fish passage structures (the Compact Bypass grade control structures, San Mateo Avenue and South Canal bifurcation structure, and fish passage facility) that would include up to 43 steps. Downstream migrating fish would encounter the Lone Willow Slough, South Canal, South Canal passage supplemental flow, and Big and Little Bertha fish screens. Most major diversions that currently divert water from Mendota Pool would be isolated from the San Joaquin River.

This alternative would also create a floodplain with an average width of approximately 3,000 feet with low-lying areas on the floodplain connected to the river to prevent fish stranding. The alternative would restore floodplain habitat that would provide about 850 acres of seasonal rearing habitat (about 470 acres of primary production habitat and 380 acres of rearing habitat) for juvenile salmon and other native fishes at a flow of about 2,500 cfs. The alternative would allow agricultural practices in the floodplain (e.g., annual crops, pasture, or floodplain-compatible permanent crops). No changes would occur at Mendota Dam, under Alternative A, although this facility would be isolated from fish migration pathways. Construction activity is expected to occur intermittently over 102 to 132 months (8.5 to 11 years).

Impact AQUA-1 (Alternative A): *Effects on Fish Habitat and Passage for Local Fish Populations.* Compared to the No-Action Alternative, there would be major improvements to habitat quality and quantity, improvements to downstream migration by installation or isolation of the major diversions, and improvements to upstream fish passage around Mendota Dam, at the San Mateo Avenue crossing, and at the South Canal bifurcation structure under Alternative A. Additionally, Alternative A would add floodplain habitat to the river system and convey flows up to 4,500 cfs. Collectively, Alternative A would increase the amount of habitat and improve habitat quality through the added floodplain area for all fish species, reduce losses through unscreened diversion, and improve conditions for upstream passage from Reach 3 to Reach 2A. Conveying Restoration Flows and providing fish passage also restores connectivity of Reach 2B to the rest of the river, and would benefit the entire Restoration Area.

Compared to existing conditions, Alternative A would increase capacity for Restoration Flows, result in improved up and downstream passage, reduce losses to diversions, and increase floodplain habitat. Alternative A would have a **beneficial** effect on fisheries associated with increased mobility within the river, and would improve and expand habitat within Reach 2B.

Impact AQUA-2 (Alternative A): *Effects on Salmonid Rearing Habitat.* Compared to the No-Action Alternative, Alternative A would construct levees capable of conveying 4,500 cfs within Reach 2B. The new levee system would create a 3,000-foot-wide floodplain through Reach 2B that would support food production and rearing habitat. Alternative A would allow inundation of 850 acres of floodplain at 2,500 cfs. This magnitude of flow would create approximately 470 acres of shallow water habitat (less than 1 foot deep) for primary production, and approximately 380 acres of deeper habitat that could directly support rearing conditions (see Figure 2-9 of Chapter 2, “Description of Alternatives”). Floodplain areas adjacent to the main channel would start inundating between 1,200 and 2,200 cfs and would encourage riparian regeneration. Riparian trees may potentially contribute large woody debris to the river channel that could be used as cover by juvenile salmonids within the river channel and on the floodplain.

Compared to existing conditions, Alternative A would enhance overall floodplain acreage along Reach 2B and provide capacity for up to 4,500 cfs. The floodplain areas adjacent to the main channel would provide additional rearing habitat not otherwise available under existing conditions. These floodplains along the river would provide additional rearing habitat and may provide sites for riparian establishment that, in time, could improve habitat conditions for juvenile rearing in Reach 2B. Alternative A would provide a **beneficial** effect on rearing habitat for juvenile salmonid species rearing in Reach 2B.

Impact AQUA-3 (Alternative A): *Effects on Upstream Migration of Adult Salmonids*. Compared to the No-Action Alternative, Alternative A would provide upstream passage from Reach 3 through Reach 2B and into Reach 2A. A fish guidance barrier would be constructed to direct fish into the Compact Bypass. The Compact Bypass would be constructed with 10 to 18 grade control steps to facilitate upstream passage. A dike separating the San Joaquin River from the Mendota Pool would minimize adult fish straying into false migration pathways. The San Mateo Avenue crossing would be rebuilt

to provide passage for adults at all migration flows. The most upstream feature adult fish would encounter is the South Canal bifurcation structure that would have fish passage provided in the form of a ladder or rock ramp fishway. The San Joaquin River control structure of the Chowchilla Bifurcation Structure would be removed, and its function would be combined with the South Canal bifurcation structure so adults could swim unimpeded into Reach 2A. Diversions would be consolidated and screened. There would be a total of 43 hydraulic jumps fish would have to pass over three river-spanning structures between Reach 3 and Reach 2A (Compact Bypass grade control structures, San Mateo Avenue, and the South Canal bifurcation structure and passage facility). All diversions would be screened or isolated in Mendota Pool, which would eliminate false migration pathways.

Under existing conditions, upstream migrating adult salmon are restricted from entering Reach 2B by Mendota Dam, and would have difficulty passing San Mateo Avenue during low flow ranges and passing the San Joaquin River control structure of the Chowchilla Bifurcation Structure at some flows. Adult salmon could also stray into the DMC, Main Canal, Helm Ditch, and Fresno Slough or into the Columbia Canal approach channel. In comparison to existing conditions, Alternative A would establish fish passage from Reach 3 through Reach 2B and into Reach 2A. Alternative A would have a **beneficial** effect by facilitating upstream migration for adult salmon and by isolating or screening possible false migration pathways.

Impact AQUA-4 (Alternative A): *Effects on Downstream Migration of Juvenile Salmonids*. Compared to the No-Action Alternative, Alternative A would improve downstream passage by screening water diversions, isolating operations of Mendota Pool from the river, and providing improved downstream passage for juvenile salmon. The South Canal bifurcation structure would provide for downstream juvenile passage and the South Canal would be screened for diversions. Screened juvenile fish would be directed back to the San Joaquin River and would not pass through Mendota Pool where they are exposed to loss through diversions and predators. Downstream fish passage would be improved at the San Mateo Avenue crossing and through the Compact Bypass, where juvenile fish would pass downstream into Reach 3 without having to pass through Mendota Dam. Under all the alternatives, fish passage and fish screening designs would be based upon criteria from Anadromous Salmonid Passage Facility Design (NMFS 2008) and Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001). Design would be further informed by the flow and depth criteria detailed in Table 2-1 of Chapter 2, “Description of Alternatives.” Outmigrating juvenile salmon would encounter four fish screens and 21 potential predation sites as they pass from Reach 2A through Reach 2B and into Reach 3.

Compared to existing conditions, Alternative A, like the No-Action Alternative, would greatly improve downstream passage for juvenile salmonids through Reach 2B from Reach 2A into Reach 3. Alternative A would have a **beneficial** effect by facilitating downstream passage.

Impact AQUA-5 (Alternative A): *Effects of In-channel Construction Activities on Fish Species within Reach 2B*. Compared to the No-Action Alternative, construction

activity in the active channel could result in adverse effects on aquatic species, including crushing, disturbance of organisms, release of sediment, and release of pollutants associated with ground disturbance or equipment operation. Adverse effects to fish during in-channel construction activities would be minimized by including some or all of the following measures (see Section 2.2.4):

- Temporary bypass facilities around construction areas that meet fish passage criteria.
- Construction in the dry (i.e., not in active flows).
- Phased construction that would allow passage to continue in the channel or in the completed portions of structures while other portions are built.
- Fish rescue and relocation.

Cofferdams would likely be used to construct the Mendota Pool Dike, San Mateo Avenue Crossing, the fish screen return outlets, and the South Canal bifurcation structure. All other structures would likely be constructed in the dry.

The Project would implement Conservation Measures EFH-1, EFH-2, CVS-1, CVS-2, PL-1, GS-1, and SRCS-1 to avoid or minimize adverse effects on Central Valley Chinook salmon, Central Valley steelhead, pacific lamprey, green sturgeon, and associated habitat (see Section 2.2.10, Table 2-8). Adverse effects from construction activities would be minimized through the following measures:

- Disturbance of riparian vegetation would be avoided to the greatest extent practicable (Conservation Measure EFH-1).
- In-channel construction activities that could affect Pacific salmonid habitat would be limited to the low-flow period between June 1 and October 1 to minimize potential for adversely affecting Federally-listed anadromous salmonids during their emigration period (Conservation Measure EFH-2).
- In-channel construction activities that could affect habitat for Pacific salmonids would be limited to daylight hours during weekdays, leaving a nighttime and weekend period of passage for Federally-listed fish species (Conservation Measure EFH-2).
- Work in documented areas of Pacific lamprey presence would be timed to avoid in-channel work during typical lamprey spawning (March 1 to July 1). If temporary dewatering in documented areas of lamprey presence is required for instream channel work, salvage methods would be implemented to capture and move ammocoetes to a safe area, in consultation with USFWS (Conservation Measure PL-1).
- Actions that would affect an introduced experimental population of Central Valley spring-run Chinook salmon would be performed in accordance with the Experimental Population 4(d) rule, where applicable (Conservation Measure SRCS-1).

The Project would also implement the following control measures to avoid or minimize release of sediment or pollutants to the river (see Section 2.2.10, Table 2-8):

- A spill prevention plan would be prepared describing measures to be taken to minimize the risk of fluids or other materials used during construction (e.g., oils, transmission and hydraulic fluids, cement, fuel) from entering the San Joaquin River or contaminating riparian areas adjacent to the river itself. Stockpiling of materials, including portable equipment, vehicles and supplies, such as chemicals, would be restricted to designated construction staging areas, exclusive of any riparian and wetland areas (Conservation Measure EFH-1).
- Construction Best Management Practices (BMPs) for off-channel staging and storage of equipment and vehicles would be implemented. BMPs would also include minimization of erosion and stormwater runoff, as appropriate (Conservation Measure EFH-2).
- A qualified biological monitor would be present during all construction activities, including clearing, grubbing, pruning, and trimming of vegetation at each job site during construction initiation, midway through construction, and at the close of construction to monitor implementation of conservation measures and water quality (Conservation Measure EFH-1).

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). Because control measures would be implemented to minimize adverse effects from in-channel construction activities, and because these impacts would occur intermittently within the overall construction timeframe for the entire Project, they are considered **less than significant**.

Impact AQUA-6 (Alternative A): ***Effects of Floodplain Use by Agriculture on Fish Species within Reach 2B.*** Compared to the No-Action Alternative, Alternative A would allow for agricultural use on the expanded floodplains within the levees. Juvenile salmon have been shown to grow more rapidly on the inundated Yolo Bypass floodway when compared to juveniles that remain in the Sacramento River (Sommer et al. 2001). A similar relationship is postulated for the San Joaquin River in Reach 2B. Agricultural use of these lands presently occurs, and moving the levees as part of Alternative A would incorporate these agricultural lands into the floodplain. The majority of the expanded floodplain would become inundated about every 2 years at flows of around 2,500 cfs and higher. Grazing of livestock, pasture, planting annual crops, or planting floodplain-compatible permanent crops would be the agricultural activities implemented on the floodplain between the levees. It is also assumed for the purpose of this analysis that agricultural activities would not occur within 300 feet of the active channel and would also not occur on any constructed floodplain benches adjacent to the main channel or on secondary channels. While flooding of a native floodplain may improve rearing habitat for outmigrating juvenile salmonids, agricultural activities may introduce contaminants (fertilizers, pesticides, manure) directly to the floodplain where they could potentially become entrained in the flow and affect juvenile fish rearing in Reach 2B or in downstream reaches.

Under existing conditions, no agricultural activities occur inside the existing levee alignments. Agricultural crops are presently grown on the area that would be incorporated into the wider floodplain, but these crops are primarily permanent crops (e.g., almonds, pistachios, grapes) that would not be suitable crops to grow in the floodplain and subject to inundation. Compared to existing conditions, agricultural uses under Alternative A would result in periodic soil disturbance, deposition of animal waste, fertilizer or pesticide applications associated with planting of grasses, annual crops or floodplain-compatible permanent crops on the floodplain. These activities would likely occur during periods when the floodplain is dry. Applicable agricultural practices would be in compliance with regulations from the Irrigated Lands Regulatory Program (see Section 14.2.3 for a description of this program). Agricultural use of the floodplain would result in an indirect impact to rearing salmonids in Reach 2B. Because these impacts would occur intermittently throughout the agricultural uses and occur under the control of existing programs, they are considered **less than significant**.

Impact AQUA-7 (Alternative A): *Effects on Occurrence of Native Fish Species within Reach 2B.* Compared to the No-Action Alternative, modifications within Reach 2B would facilitate up and downstream passage for native fishes in addition to juvenile and adult salmon. Native fish include lamprey species, Sacramento sucker, Sacramento pikeminnow, hardhead, hitch, Sacramento blackfish, prickly sculpin, and others. While Restoration Flows would assist in native species dispersal from upstream, the fish passage facilities would aid in downstream dispersal. Fish screens designed to help protect juvenile salmon and larger life stages would also protect similar sized juvenile fish from entrainment into diversions. The increased capacity and expansion of floodplains would also produce additional habitat for rearing larval and juvenile native fishes, in addition to habitat available in the channel. Isolation of Mendota Pool from the San Joaquin River would also provide a benefit to native fishes dispersing through the river or living in Reach 2B.

Under existing conditions, native fish moving downstream in Reach 2B are exposed to entrainment at the many unscreened diversions in Mendota Pool. Except for flood years, native fishes are not able to pass upstream over Mendota Dam and may also have difficulty moving upstream of the San Mateo Avenue crossing or through the Chowchilla Bifurcation Structure. Native fishes are exposed to nonnative piscivores in Mendota Pool. Compared to existing conditions, Alternative A would screen diversions along the San Joaquin River. While screens would not be designed specifically to screen all life stages of native fish, they would be designed to screen fry-sized and larger salmon, and would reduce the loss of juvenile life stages of native fishes to the diversions. Isolating the Pool from the river would reduce predation in Mendota Pool. Increasing capacity, expanding the floodplain, and adding floodplain benches adjacent to the main channel would provide additional habitat that would support larval and juvenile native fishes. In combination, these actions would greatly improve the ability of native fishes to move through and live within Reach 2B. Compared to existing conditions, this would be a **beneficial** effect.

Impact AQUA-8 (Alternative A): *Effects on Predation of Juvenile Salmonids and Native Fish Species.* Compared to the No-Action Alternative, Alternative A would add

several structures while eliminating several features that may harbor predators along the migratory path of juvenile salmon. The No-Action Alternative has numerous diversion intakes in Mendota Dam, Mendota Pool with numerous diversion intakes, and the Chowchilla Bifurcation Structure. Alternative A would have the Compact Bypass, South Canal bifurcation structure, fish screens, and fish bypass return. The total number of potential predation sites associated with artificial structures is 21; however, the isolation of Mendota Pool from the river would eliminate a potentially large predator population from interacting with the outmigrating juvenile salmon.

Under existing conditions, juvenile salmon moving downstream in Reach 2B are exposed to predation at the flow control structures, unscreened intakes, and in Mendota Pool. Isolating the pool and many of the intake structures from the river would reduce opportunities for predation on outmigration juvenile salmon; however, additional structures would be added to the outmigration corridor, including grade control structures in the Compact Bypass and fish passage facilities at the South Canal bifurcation structure. In combination with increased capacity and the widened floodplain, these actions would greatly improve the ability of juvenile salmon to move through Reach 2B even though they would be experiencing some level of predation. Compared to existing conditions, this would be a **beneficial** effect.

Impact AQUA-9 (Alternative A): ***Effects on the Aquatic Food Web within Reach 2B.*** Compared to the No-Action Alternative, Alternative A would provide improved food-web conditions through increased capacity and expanded floodplains. Levees would be set back and floodplain areas would be expanded, making it possible to inundate the majority of the floodplain about every other year through Restoration Flows up to 4,500 cfs, which would potentially create conditions for improved primary and secondary production that would otherwise not occur.

When comparing Alternative A to existing conditions, effects on the aquatic food web would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). Compared to existing conditions, the increased floodplain area, increased frequency of inundation, and the wider floodplains under Alternative A, combined with Restoration Flows, would have a **beneficial** effect on the aquatic food web.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Under Alternative B, construction of new Project facilities would occur, including a new levee system capable of conveying flows up to 4,500 cfs with 3 feet of freeboard; and a new bypass channel, capable of conveying Restoration Flows around Mendota Pool and Mendota Dam, with 2 to 6 grade control structures to aid in upstream passage of adult and juvenile salmon and other native fishes. A new bifurcation structure would be constructed at the head of the Compact Bypass that would control flows down the San Joaquin River and into Mendota Pool. The Mendota Pool Control Structure would include a fish screen capable of screening juvenile salmon up to flows of 2,500 cfs with a fish return system that conveys screened fish back to the Compact Bypass. The San Mateo Avenue crossing would be removed. Alternative B would modify the Chowchilla

Bifurcation Structure to improve fish passage through the San Joaquin River Control Structure and add a NMFS-approved fish passage facility on that control structure when operations prevent passage through the structure.

Alternative B would include three upstream passage structures (Compact Bypass grade control structures, Compact Bypass Bifurcation Structure and fish passage facility, and the Chowchilla Bifurcation Structure and fish passage facility) that would include up to 54 steps. Downstream migrating fish would encounter the Chowchilla Bifurcation Structure passage facility supplemental flow, Lone Willow Slough, Big and Little Bertha, Compact Bypass Control Structure passage facility supplemental flow, and Mendota Pool Control Structure fish screens. Most major diversions that currently divert water from Mendota Pool would be isolated from the San Joaquin River.

This alternative would also create a floodplain with an average width of approximately 4,200 feet with low-lying areas on the floodplain connected to the river to prevent fish stranding. The alternative would restore floodplain habitat that would provide about 1,000 acres of seasonal rearing habitat (about 440 acres of primary production habitat and 560 acres of rearing habitat) for juvenile salmon and other native fishes at a flow of about 2,500 cfs. The floodplain under Alternative B would be about 44 percent primary production habitat at 2,500 cfs and about 42 percent at 4,500 cfs. The alternative would allow agricultural practices in the floodplain (e.g., annual crops, pasture, or floodplain-compatible permanent crops). No changes would occur at Mendota Dam under Alternative B. Construction activity is expected to occur intermittently over 106 to 157 months (9 to 13 years).

Impact AQUA-1 (Alternative B): ***Effects on Fish Habitat and Passage for Local Fish Populations***. Compared to the No-Action Alternative, there would be major improvements to habitat quality and quantity, improvements to up and downstream fish passage, and a reduction in entrainment under Alternative B. Alternative B would increase capacity to convey up to 4,500 cfs in flows through the reach, increase the amount of habitat, and improve habitat quality for all fish species in Reach 2B. Providing fish passage also restores connectivity of Reach 2B to the rest of the river and would have benefits throughout the Program area.

Compared to existing conditions, Alternative B would result in improved up and downstream passage, reduced loss of fish to diversions, and an increase in floodplain habitat. Alternative B would have a **beneficial** effect on fisheries associated with increased survival of juvenile life stages, increase connectivity within the river, and improved and expanded habitat within Reach 2B.

Impact AQUA-2 (Alternative B): ***Effects on Salmonid Rearing Habitat.*** Compared to the No-Action Alternative, Alternative B would provide a new levee system that would create a 4,200 foot average-width floodplain through Reach 2B that would support food production and rearing habitat. The levee setbacks under Alternative B would allow inundation of 1,000 acres of floodplain at 2,500 cfs. This magnitude of flow would create approximately 440 acres of shallow water habitat (less than 1 foot deep) for primary production and approximately 560 acres of deeper habitat that could directly support

rearing conditions (see Figure 2-12 of Chapter 2, "Description of Alternatives"). Floodplain areas adjacent to the main channel would start inundating between 1,200 and 2,200 cfs and would encourage riparian regeneration. Riparian trees may potentially contribute large woody debris to the river channel that could be used as hydraulic cover by juvenile salmonids within the river channel and on the floodplain.

Compared to existing conditions, Alternative B would provide enhanced rearing conditions on the widened floodplain acreage along Reach 2B and provide capacity for up to 4,500 cfs. The floodplain areas adjacent to the main channel would provide additional rearing habitat not otherwise available under existing conditions. These floodplains along the river may provide sites for riparian establishment that, in time, could improve habitat conditions in the channel for juvenile rearing in Reach 2B. Alternative B would provide a **beneficial** effect on rearing habitat for juvenile salmonids rearing in Reach 2B.

Impact AQUA-3 (Alternative B): *Effects on Upstream Migration of Adult Salmonids*. Compared to the No-Action Alternative, Alternative B would provide upstream passage from Reach 3 through Reach 2B and into Reach 2A. The Compact Bypass would be constructed with two to six grade control steps to facilitate upstream passage. A fish passage facility (a ladder or rock ramp fish way) would provide up and downstream fish passage between the Compact Bypass and the river upstream of the Compact Bypass Control Structure during times when operation of the control structure impedes passage. The Mendota Pool Control Structure may allow some straying, but a fish screen would prevent adult fish from entering Mendota Pool. The San Mateo Avenue crossing would be removed. The Chowchilla Bifurcation Structure would have a fish passage facility to provide passage when operation impedes passage through the structure. All other diversions would be consolidated and/or screened. There would be a total of 54 hydraulic steps that fish would have to pass over three river-spanning structures between Reach 3 and Reach 2A (Compact Bypass grade control structures, Compact Bypass Control Structure and passage facility, and the Chowchilla Bifurcation Structure and passage facility). Diversions would be screened or isolated in Mendota Pool, which would eliminate false migration pathways.

This alternative does not include a fish barrier at the downstream end of the Compact Bypass to keep fish from migrating upstream of the Compact Bypass in Reach 3 toward the base of Mendota Dam. A false migration pathway up to the base of Mendota Dam – of approximately 2,000 feet – would be available to fish in all years, and a false migration pathway into Mendota Pool and Fresno Slough (potentially into the King River system) would occur about once in 5 years when the boards are taken out of Mendota Dam to pass Pine Flat flood releases into Reach 3. A false migration pathway to Mendota Dam would also occur under the No-Action Alternative. Because the Compact Bypass would provide upstream passage under Alternative B, the false migration pathway would affect less fish than under the No-Action Alternative.

When comparing Alternative B to existing conditions, effects would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to the No-Action Alternative). Compared to existing conditions, Alternative B would establish fish

passage from Reach 3 through Reach 2B and into Reach 2A. As described above fish passage would be greatly improved over existing conditions. Alternative B would have a **beneficial** effect by facilitating upstream migration for adult salmon and by isolating or screening possible false migration pathways.

Impact AQUA-4 (Alternative B): *Effects on Downstream Migration of Juvenile Salmonids.* Compared to the No-Action Alternative, Alternative B would improve downstream passage by screening water diversions, isolating operations of Mendota Pool from the river, and providing improved downstream passage for juvenile salmon. The Mendota Pool Control Structure may be screened for diversions. Screened juvenile fish would be directed back to the San Joaquin River in the Compact Bypass and would not pass through Mendota Pool where they would be exposed to loss through diversions and predators. Even if not screened, the Mendota Pool Fish Screen would only be operated for Exchange Contractor diversions in summer months in highly infrequent dry years or during flood flow deliveries, when flows split several times before entering Mendota Pool and fish survival through the bypasses is high. Downstream fish passage would be improved at the Chowchilla Bifurcation Structure by installation of a fish passage facility on the San Joaquin River Control Structure. A fish passage facility at the Compact Bypass Control Structure would allow fish to migrate around when operations impede downstream passage. The San Mateo Avenue crossing would be removed. Outmigrating juvenile salmon would encounter three river spanning structures, five fish screens, and nine potential predation sites as they pass from Reach 2A through Reach 2B and into Reach 3.

When comparing Alternative B to existing conditions, effects would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to the No-Action Alternative). Compared to existing conditions, Alternative B would greatly improve downstream passage for juvenile salmonids through Reach 2B from Reach 2A into Reach 3. Alternative B would have a **beneficial** effect by facilitating downstream passage.

Impact AQUA-5 (Alternative B): *Effects of In-channel Construction Activities on Fish Species within Reach 2B.* Compared to the No-Action Alternative, Alternative B would include in-water construction and effects would be similar to Alternative A; refer to Impact AQUA-5 (Alternative A) for details. Measures employed in Alternative A, such as in-water construction techniques, would be employed in Alternative B, and would minimize effects of the cofferdams on fish and aquatic biota in Reach 2B during construction.

Compared to existing conditions, Alternative B would have a **less than significant** impact on fish and aquatic organisms due to these measures.

Impact AQUA-6 (Alternative B): *Effects of Floodplain Use by Agriculture on Fish Species within Reach 2B.* Compared to the No-Action Alternative, Alternative B would allow for agricultural use on the expanded floodplains within the levees and effects would be similar to Alternative A; refer to Impact AQUA-6 (Alternative A), with the following exceptions. Agricultural practices (e.g., annual crops, pasture, or floodplain-

compatible permanent crops) could occur on the floodplain in previous agricultural areas outside of State-owned and public trust lands. Growers would be required to leave cover on the ground and would be required to develop and implement a Water Quality Plan, approved by the Reclamation, to meet then-existing water quality standards for coldwater fisheries beneficial in downstream areas.

Similar to Alternative A, it is also assumed for the purpose of this analysis that agricultural activities would not occur within 300 feet of the active channel and would also not occur on any constructed floodplain benches adjacent to the main channel or on secondary channels. While flooding of a native floodplain may improve rearing habitat for outmigrating juvenile salmonids, agricultural activities may introduce contaminants (fertilizers, pesticides, manure) directly to the floodplain where they could potentially become entrained in the flow and affect juvenile fish rearing in Reach 2B or in downstream reaches.

Compared to existing conditions, agricultural uses under Alternative B would result in periodic soil disturbance, deposition of animal waste, fertilizer or pesticide applications associated with planting of grasses, annual crops or floodplain-compatible permanent crops on the floodplain. These activities would likely occur during periods when the floodplain is dry. Agricultural use of the floodplain would result in an indirect impact to rearing salmonids in Reach 2B. Because these impacts would occur intermittently throughout the agricultural uses and occur under the control of a water quality plan, they are considered **less than significant**.

Impact AQUA-7 (Alternative B): ***Effects on Occurrence of Native Fish Species within Reach 2B.*** Compared to the No-Action Alternative, Alternative B would be similar in performance to Alternative A with the following exceptions; refer to Impact AQUA-7 (Alternative A) for more detail.

- Under Alternative B, there would be a greater amount of floodplain habitat restored that would produce additional habitat for rearing larval and juvenile native fishes than in Alternative A.
- Under Alternative B, upstream native fish passage would be more difficult because there is potentially 11 additional hydraulic jumps to pass than in Alternative A.
- Survival in Reach 2B may be less difficult than in Alternative A because there are 12 fewer predation sites.

Similar to Alternative A, partial or complete isolation of Mendota Pool from the San Joaquin River would also provide a benefit to native fishes dispersing through the river or living in Reach 2B. Overall, Alternative B would provide improved conditions for native fish species in Reach 2B.

Compared to existing conditions, Alternative B would have a similar or better performance than Alternative A, with the exceptions noted above. In combination, these

actions would improve the ability of native fishes to move through and live within Reach 2B. Compared to existing conditions, this would be a **beneficial** effect.

Impact AQUA-8 (Alternative B): ***Effects on Predation of Juvenile Salmonids and Native Fish Species.*** Compared to the No-Action Alternative, Alternative B would perform similarly to Alternative A with respect to predation effects; refer to Impact AQUA-8 (Alternative A) for details. Alternative B has nine potential predation sites. The No-Action Alternative includes Mendota Pool with numerous diversion intakes and predation sites and Mendota Dam. Alternative B would have improved fish passage conditions and partially or completely isolate Mendota Pool from the San Joaquin River. Overall, predation is likely reduced compared to the No-Action Alternative.

Compared to existing conditions, Alternative B would be similar in performance to Alternative A (see above). Compared to the existing conditions, overall predation would be reduced, which would be a **beneficial** effect.

Impact AQUA-9 (Alternative B): ***Effects on the Aquatic Food Web within Reach 2B.*** Compared to the No-Action Alternative, Alternative B would provide improved food-web conditions through increased capacity and expanded floodplains. Levees would be set back and floodplain areas would be expanded, making it possible to inundate the majority of the floodplain about every other year through Restoration Flows up to 4,500 cfs, which would potentially create conditions for improved primary and secondary production that would otherwise not occur.

When comparing Alternative B to existing conditions, effects on the aquatic food web would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to the No-Action Alternative). Compared to existing conditions, the increased floodplain area, increased frequency of inundation, and the wider floodplains under Alternative B combined with Restoration Flows would have a **beneficial** effect on the aquatic food web.

Alternative C (Fresno Slough Bypass with Narrow Floodplain and Short Canal)

Under Alternative C, construction of new Project facilities would occur, including a new levee system capable of conveying flows up to 4,500 cfs with 3 feet of freeboard. Mendota Pool would be restricted to Fresno Slough and the San Joaquin River would bypass Mendota Pool through its historic channel and would be capable of conveying Restoration Flows through Mendota Dam into Reach 3. Mendota Dam would be modified with a fish passage facility to allow passage when operations would impede passage at Mendota Dam. Five to 10 grade control structures would be added downstream of Mendota Dam to backwater the apron of Mendota Dam and facilitate fish passage. Fresno Slough Dam would be constructed in Fresno Slough with a fish directional barrier installed below the Fresno Slough Dam to prevent adult fish from migrating into Fresno Slough during Kings River flood releases. Diversions would be made to Mendota Pool by re-installing flashboards in Mendota Dam and taking water into the pool through the Short Canal. The Short Canal would be screened for juvenile salmon. Screened fish would be returned to the San Joaquin River. A fish guidance barrier would be installed below the proposed Fresno Slough Dam to guide adult salmon

upstream to the San Joaquin River. The San Mateo Avenue Crossing would be improved. Alternative C would modify the Chowchilla Bifurcation Structure to improve fish passage through the San Joaquin River Control Structure and add a fish passage facility on the structure for times when operations impede passage through the structure. Sediment removal in the San Joaquin River is assumed to occur to bring the channel bed into a new equilibrium grade through the former San Joaquin arm of the Mendota Pool.

Alternative C would include four upstream passage structures (Mendota Dam grade control structures, Mendota Dam, San Mateo Avenue and the Chowchilla Bifurcation Structure and fish passage facility) that would include up to 59 steps. Downstream migrating fish would encounter the Chowchilla Bifurcation Structure passage facility supplemental flow, Lone Willow Slough, Big and Little Bertha, and Short Canal fish screens. Most major diversions that currently divert water from Mendota Pool would be isolated from the San Joaquin River. Sediment removal in the San Joaquin River is assumed under this alternative to bring the channel bed into a new equilibrium grade through the former Mendota Pool area.

This alternative would create a floodplain with an average width of approximately 3,000 feet with low-lying areas on the floodplain connected to the river to prevent fish stranding. The alternative would restore floodplain habitat that would provide about 750 acres of seasonal rearing habitat (about 520 acres of primary production habitat and 230 acres of rearing habitat) for juvenile salmon and other native fishes at a flow of about 2,500 cfs. In this alternative, the floodplain would not be used for agricultural activities. Construction activity is expected to occur intermittently over 91 to 133 months (7.5 to 11 years).

Impact AQUA-1 (Alternative C): ***Effects on Fish Habitat and Passage for Local Fish Populations.*** Compared to the No-Action Alternative, Alternative C would be very similar to Alternative A; refer to Impact AQUA-1 (Alternative A) for details. Alternative C would increase capacity to convey up to 4,500 cfs in flows through the reach and increase the amount of habitat and improve habitat quality for all fish species in Reach 2B. Conveying Restoration Flows and providing fish passage also restores connectivity of Reach 2B to the rest of the river and would have benefits throughout the Program area.

Compared to existing conditions, Alternative C would perform similar to Alternative A. Alternative C would have a **beneficial** effect on fisheries associated with increased mobility within the river and improved and expanded habitat within Reach 2B.

Impact AQUA-2 (Alternative C): ***Effects on Salmonid Rearing Habitat.*** Compared to the No-Action Alternative, Alternative C would perform similar to Alternative A because it has about the same amount of expanded floodplain; refer to Impact AQUA-2 (Alternative A) for details. Alternative C would provide for an average floodplain of about 3,000 feet. Alternative C would allow inundation of 750 acres of floodplain at 2,500 cfs. This magnitude of flow would create approximately 520 acres of shallow water habitat (less than 1 foot deep) for primary production and approximately 230 acres of deeper habitat that could directly support rearing conditions (see Figure 2-15 of Chapter

2, "Description of Alternatives"). Alternative C would improve rearing habitat conditions for juvenile salmonids in Reach 2B.

Compared to existing conditions, Alternative C would perform similar to Alternative A, because about the same amount of expanded floodplain would occur under both alternatives. Alternative C would have a **beneficial** effect on juvenile salmon rearing habitat within Reach 2B.

Impact AQUA-3 (Alternative C): ***Effects on Upstream Migration of Adult Salmonids***. Compared to the No-Action Alternative, Alternative C would substantially improve upstream passage from Reach 3 into Reach 2A. Alternative C would typically provide passage over Mendota Dam by removing the flashboards and adding five to ten grade control structures to backwater the river over a notched Mendota Dam sill. Mendota Pool would be restricted to Fresno Slough with water delivery from the San Joaquin River into Mendota Pool through the Short Canal. When water deliveries from the San Joaquin River are made to Mendota Pool, the flashboards would be installed in the dam and passage would occur through a fish passage facility around the dam. A fish directional barrier would be installed below the Fresno Slough Dam to prevent adult fish from migrating into Fresno Slough during Kings River flood releases from the Fresno Slough Dam. The San Mateo Avenue crossing would be improved. The Chowchilla Bifurcation Structure would have a fish passage facility to provide passage when operation impedes passage through the structure. All other diversions would be consolidated and screened. Upstream migration adults would encounter four river spanning structures (Mendota Dam grade control structures, Mendota Dam, San Mateo Avenue, and Chowchilla Bifurcation Structure and passage facility) with up to 59 steps. Alternative C would improve passage conditions compared to the No-Action Alternative.

Under existing conditions, upstream migrating adult salmon are restricted from entering Reach 2B by Mendota Dam. In comparison to existing conditions, Alternative C would create fish passage through Reach 2B from Reach 3 and into Reach 2A (see above). Alternative C would have a **beneficial** effect by allowing upstream migrating adults to pass upstream to potential spawning habitat.

Impact AQUA-4 (Alternative C): ***Effects on Downstream Migration of Juvenile Salmonids***. In comparison to the No-Action Alternative, Alternative C would improve downstream passage of juvenile salmonids by screening water diversions, isolating operations of Mendota Pool from the river and providing improved downstream passage for juvenile salmon. Juvenile salmon would be prevented from entering Mendota Pool by a fish screen at the head of the Short Canal. Downstream fish passage would be improved at the Chowchilla Bifurcation Structure by installation of a fish passage facility on the San Joaquin River Control Structure. The San Mateo Avenue crossing would be improved to facilitate downstream passage. Outmigrating juvenile salmon would encounter four river spanning structures, five fish screens, and 14 potential predation sites as they move through Reach 2B.

Compared to existing conditions, Alternative C would improve downstream migration of juvenile salmonids through Reach 2B from Reach 2A into Reach 3 for the same reasons

as mentioned in the above paragraph. As such, Alternative C would have a **beneficial** effect on downstream passage of juvenile salmonids.

Impact AQUA-5 (Alternative C): *Effects of In-channel Construction Activities on Fish Species within Reach 2B*. Compared to the No-Action Alternative, Alternative C would include in-water construction, and the effects would be similar to Alternative A; refer to Impact AQUA-5 (Alternative A) for details. Measures employed in Alternative C, such as in-water construction techniques, would be the same as those employed in Alternative A, and would minimize the effects of the cofferdams on fish and aquatic biota in Reach 2B during construction.

Compared to existing conditions, Alternative C would have a **less than significant** impact on fish and aquatic organisms due to these measures.

Impact AQUA-6 (Alternative C): *Effects of Floodplain Use by Agriculture on Fish Species within Reach 2B*. Similar to the No-Action Alternative, Alternative C does not support agricultural purposes on the expanded floodplains within the levees; therefore, there would be no effect of floodplain agricultural activities on rearing salmonids in Reach 2B.

Compared to existing conditions, Alternative C would have **no effect** from floodplain agricultural activities on rearing salmonids.

Impact AQUA-7 (Alternative C): *Effects on Occurrence of Native Fish Species within Reach 2B.* Compared to the No-Action Alternative, Alternative C would perform slightly better than Alternative A; refer to Impact AQUA-7 (Alternative A) for details. While both alternatives have about the same amount of floodplain for rearing larval and juvenile native fishes, Alternative C has fewer potential predation sites. Isolation of Mendota Pool from the San Joaquin River would also provide a benefit to native fishes dispersing through the river or living in Reach 2B under Alternative C. Overall, Alternative C would provide improved conditions for native fish species in Reach 2B.

Compared to existing conditions, Alternative C would have similar or better performance than Alternative A because of the reduced number of potential predation sites. In combination, the actions described above would improve the ability of native fishes to move through and live within Reach 2B. Compared to existing conditions, this would be a **beneficial** effect.

Impact AQUA-8 (Alternative C): *Effects on Predation of Juvenile Salmonids and Native Fish Species.* Compared to the No-Action Alternative, Alternative C would perform slightly better than Alternative A; refer to Impact AQUA-8 (Alternative A) for details. The No-Action Alternative includes Mendota Pool with numerous diversion intakes and associated potential predation sites while Alternative C would reduce the total number of potential predation sites to 14, isolate Mendota Pool from the San Joaquin River and minimize the number of potential predation sites remaining in the river. As a result, Alternative C would likely reduce predation compared to the No-Action Alternative.

Compared to existing conditions, Alternative C would perform slightly better than Alternative A, for the reason mentioned in the paragraph above, and would have fewer potential predation sites than Alternative A. Compared to the existing conditions, overall predation would be reduced, which would have a **beneficial** effect.

Impact AQUA-9 (Alternative C): ***Effects on the Aquatic Food Web within Reach 2B.*** Compared to the No-Action Alternative, Alternative C would perform similarly to Alternative A because both alternatives have about the same size floodplain and other such features; refer to Impact AQUA-9 (Alternative A) for details. Levees would be set back a similar distance and floodplain areas would be expanded, making it possible to inundate the majority of the floodplain about every other year through Restoration Flows up to 4,500 cfs, which would potentially create conditions for primary and secondary production that would not otherwise occur. Alternative C would improve aquatic food web conditions within Reach 2B relative to the No-Action Alternative.

When comparing Alternative C to existing conditions, effects on the aquatic food web would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative C to the No-Action Alternative). The increased floodplain area, increased frequency of inundation, and the wider floodplains under Alternative C, combined with Restoration Flows, would have a **beneficial** effect on the aquatic food web.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Under Alternative D, construction of new Project facilities would occur, including a new levee system capable of conveying flows up to 4,500 cfs with 3 feet of freeboard. Mendota Pool would be restricted to Fresno Slough and the San Joaquin River would bypass Mendota Pool through its historic channel. The San Joaquin River would be capable of conveying Restoration Flows through Mendota Dam into Reach 3. Mendota Dam would be modified with a fish passage facility to allow passage when operations would impede passage at Mendota Dam. Five to 10 grade control structures would be added downstream of Mendota Dam to backwater the apron of Mendota Dam and facilitate fish passage. Fresno Slough Dam would be constructed in Fresno Slough with a fish directional barrier installed below the Fresno Slough Dam to prevent adult fish from migrating into Fresno Slough during Kings River flood releases. Diversions to Mendota Pool would occur at the new North Canal bifurcation structure that would provide up to 2,500 cfs diversion into the North Canal and up to 4,500 cfs to the San Joaquin River. The North Canal intake would include a fish screen capable of screening juvenile salmon and a fish return system that conveys screened fish back to the river. An upstream fish passage facility would be constructed at the North Canal bifurcation structure to provide upstream passage when operations impede passage through the structure. San Mateo Avenue crossing and the existing San Joaquin River control structure of the Chowchilla Bifurcation Structure would be removed.

Alternative D would include four upstream passage structures (Mendota Dam grade control structures, Mendota Dam, and the North Canal bifurcation structure and passage facility) totaling up to 36 steps. Downstream migrating fish would encounter the Lone Willow Slough, North Canal passage facility supplemental flow, and the North Canal and Big and Little Bertha fish screens. Most major diversions that currently divert water from

the Mendota Pool would be isolated from the San Joaquin River. Sediment removal in the San Joaquin River is assumed under this alternative to bring the channel bed into a new equilibrium grade through the former Mendota Pool area.

This alternative would create a floodplain with an average width of approximately 4,200 feet with low-lying areas on the floodplain connected to the river to prevent fish stranding. The alternative would restore floodplain habitat that would provide about 1,050 acres of seasonal rearing habitat (about 740 acres of primary production habitat and 310 acres of rearing habitat) for juvenile salmon and other native fishes at a flow of about 2,500 cfs. The alternative would allow agricultural practices in the floodplain (e.g., annual crops, pasture, or floodplain-compatible permanent crops). Construction activity is expected to occur intermittently over 97 to 158 months (8 to 13 years).

Impact AQUA-1 (Alternative D): ***Effects on Fish Habitat and Passage for Local Fish Populations.*** Compared to the No-Action Alternative, Alternative D would be very similar in performance to Alternative B; refer to Impact AQUA-1 (Alternative B) for details. Alternative D has a similar sized floodplain as Alternative B and would increase capacity to convey up to 4,500 cfs in flows through the reach, which would increase the amount of habitat and improve habitat quality for all fish species in Reach 2B. Conveying Restoration Flows and providing fish passage would also restore connectivity through Reach 2B to the rest of the river, and would have benefits throughout the Program area.

Compared to existing conditions, Alternative D would be very similar performance to Alternative B. Alternative D would have a **beneficial** effect on fisheries using and moving through Reach 2B.

Impact AQUA-2 (Alternative D): ***Effects on Salmonid Rearing Habitat***. Compared to the No-Action Alternative, Alternative D would perform similar to Alternative B; refer to Impact AQUA-2 (Alternative B) for details. Alternative D would create about the same amount of new floodplain rearing habitat that would inundate 1,050 acres at 2,500 cfs. This magnitude of flow would create approximately 740 acres of shallow water habitat (less than 1 foot deep) for primary production and approximately 310 acres of deeper habitat that could directly support rearing conditions (see Figure 2-19 of Chapter 2, “Description of Alternatives”). Floodplain benches adjacent to the main channel could encourage riparian regeneration similar to Alternative B. Alternative D would improve salmonid rearing habitat in Reach 2B.

Compared to existing conditions, Alternative D would create a substantial amount of floodplain habitat that could be used as rearing habitat for juvenile salmonids (see above), and would be similar in performance to Alternative B. Alternative D would provide a **beneficial** effect on rearing habitat for listed salmonid species by expanding floodplain habitat supporting rearing juvenile salmon.

Impact AQUA-3 (Alternative D): ***Effects on Upstream Migration of Adult Salmonids***. In comparison to the No-Action Alternative, Alternative D would improve upstream passage from Reach 3 into Reach 2B, and from Reach 2B into Reach 2A. Under this alternative, the concrete portions of Mendota Dam would remain in place, the sill would

be notched to improve fish passage and the five to 10 grade control structures installed downstream to backwater the river over the sill. The flash boards at the dam would be removed and flows would pass over the notched sill. The Fresno Slough Dam would be constructed in Fresno Slough with a fish directional barrier installed below the Fresno Slough Dam to prevent adult fish from migrating into Fresno Slough during Kings River flood releases. The North Canal bifurcation structure would be constructed to allow water deliveries from Reach 2B to Mendota Pool and to control flows from the San Joaquin River into the Chowchilla Bypass. The San Mateo Avenue road crossing and the existing San Joaquin River control structure of Chowchilla Bifurcation Structure would be removed under this alternative. Alternative D would result in three main river spanning structures (Mendota Dam grade control structures, Mendota Dam, and the North Canal bifurcation structure and passage facility) having up to 36 steps. All diversions would be screened or isolated in Mendota Pool, which would eliminate false migration pathways.

Under existing conditions, upstream migrating adult salmonids are restricted from entering Reach 2B by Mendota Dam, and would have difficulty passing San Mateo Avenue during low flow ranges and passing the San Joaquin River control structure of the Chowchilla Bifurcation Structure at some flows. Adult salmon could also stray into the DMC, Main Canal, Helm Ditch, and Fresno Slough or into the Columbia Canal approach channel. In comparison to existing condition, Alternative D would improve upstream fish passage through Reach 2B from Reach 3 and into Reach 2A for the reasons mentioned above. Alternative D would have a **beneficial** effect by allowing upstream migrating adults to pass upstream to potential spawning habitat.

Impact AQUA-4 (Alternative D): ***Effects on Downstream Migration of Juvenile Salmonids***. In comparison to the No-Action Alternative, Alternative D would be similar in performance to Alternative C; refer to Impact AQUA-4 (Alternative C) for details. Juvenile fish would encounter the same number of fish screens and potential predation sites as they would under Alternative C, so performance of the two alternatives for downstream migration would be similar. Alternative D would improve conditions relative to the No-Action Alternative.

Compared to existing conditions, Alternative D would be similar in performance as Alternative C, because fish would encounter the same number and types of fish screens and potential predation sites. As such, Alternative D would have a **beneficial** effect on downstream passage of juvenile salmonids.

Impact AQUA-5 (Alternative D): ***Effects of In-channel Construction Activities on Fish Species within Reach 2B.*** Compared to the No-Action Alternative, Alternative D would include in-water construction and effects would be similar to Alternative A; refer to Impact AQUA-5 (Alternative A) for details. Measures employed in Alternative A, such as in-water construction techniques, would be employed in Alternative D, and would minimize effects of the cofferdams on fish and aquatic biota in Reach 2B during construction.

Compared to existing conditions, Alternative D would have a **less than significant** impact on fish and aquatic organisms due to these measures.

Impact AQUA-6 (Alternative D): *Effects of Floodplain Use by Agriculture on Fish Species within Reach 2B.* Compared to the No-Action Alternative, Alternative D would perform similarly to Alternative A; refer to Impact AQUA-6 (Alternative A) for details. Agricultural use of these lands presently occurs under the No-Action Alternative, moving the levees would incorporate these agricultural lands into the floodplain. The majority of the expanded floodplain would become inundated about every 2 years at flows of around 2,500 cfs and higher. Juvenile salmon have been shown to grow more rapidly on the inundated Yolo Bypass floodway when compared to juveniles that remain in the Sacramento River (Sommer et al. 2001). A similar relationship is postulated for the San Joaquin River in Reach 2B.

Grazing of livestock, pasture, planting annual crops, or planting floodplain-compatible permanent crops would be the agricultural activities implemented on the floodplain between the levees. It is also assumed for the purpose of this analysis that agricultural activities would not occur within 300 feet of the active channel and would also not occur on any constructed floodplain benches adjacent to the main channel or on secondary channels. While flooding of a native floodplain may improve rearing habitat for outmigrating juvenile salmonids, agricultural activities may introduce contaminants (fertilizers, pesticides, manure) directly to the floodplain where they could potentially become entrained in the flow and affect juvenile fish rearing in Reach 2B or in downstream reaches.

Under existing conditions, no agricultural activities occur inside the existing levees. Agricultural crops are presently grown on the area that would be incorporated into the wider floodplain, but these crops are primarily permanent crops (e.g., almonds, pistachios, grapes) and would likely not be suitable crops to grow in the floodplain. Compared to existing conditions, agricultural uses under Alternative D would result in periodic soil disturbance, deposition of animal waste, fertilizer or pesticide applications associated with planting of grasses, annual crops or floodplain-compatible permanent crops on the floodplain. These activities would likely occur during periods when the floodplain is dry. Agricultural use of the floodplain would result in an indirect impact to rearing salmonids in Reach 2B. Because these impacts would occur intermittently throughout the agricultural uses and occur under the control of existing programs, they are considered **less than significant**.

Impact AQUA-7 (Alternative D): *Effects on Occurrence of Native Fish Species within Reach 2B.* Compared to the No-Action Alternative, modifications within Reach 2B under Alternative D would be similar in performance to Alternative B; refer to Impact AQUA-7 (Alternative B) for details. The increased capacity and expansion of floodplains would produce additional habitat for rearing larval and juvenile native fishes. Similar to other alternatives, isolation of Mendota Pool from the San Joaquin River would also provide a benefit to native fishes dispersing through the river or living in Reach 2B.

Compared to existing conditions, Alternative D would have similar performance as Alternative B (see above). Alternative D would have one less fish screen (four instead of five) fewer predation sites (14 instead of 22), which would improve the performance of Alternative D relative to Alternative B. In combination, these actions would improve the

ability of native fishes to move through Reach 2B and greatly expand the habitat within Reach 2B. Compared to existing conditions, this would be a **beneficial** effect.

Impact AQUA-8 (Alternative D): *Effects on Predation of Juvenile Salmonids and Native Fish Species.* Compared to the No-Action Alternative, Alternative D would perform similar to Alternative C; refer to Impact AQUA-8 (Alternative C) for details.

The No-Action Alternative includes continued operation of Mendota Pool with numerous diversion intakes and associated potential predation sites, and potential predation sites at Mendota Dam and the Chowchilla Bifurcation Structure. Alternative D would have potential predation sites at the North Canal bifurcation structure, Mendota Dam, and the Mendota Dam grade control structures. However, the North Canal fish screen would screen water flowing into Mendota Pool and the pool would be isolated from the river. The San Joaquin River control structure of the Chowchilla Bifurcation Structure and the San Mateo Avenue crossing would be removed. Alternative D would reduce predation compared to the No-Action Alternative.

Compared to existing conditions, Alternative D would be similar in performance to Alternative C (see above). Alternative D has the same number of screens and potential predation sites as Alternative C. Compared to the existing conditions, this would be a **beneficial** effect.

Impact AQUA-9 (Alternative D): *Effects on the Aquatic Food Web within Reach 2B.* Compared to the No-Action Alternative, Alternative D would be similar in performance to Alternative B, because both alternatives have about the same amount of floodplain habitat; refer to Impact AQUA-9 (Alternative B) for details. Levees would be set back and floodplain areas would be expanded, making it possible to inundate the majority of the floodplain about every other year through Restoration Flows up to 4,500 cfs, which would potentially create conditions for improved primary and secondary production that would otherwise not occur.

When comparing Alternative D to existing conditions, effects on the aquatic food web would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative D to the No-Action Alternative). Compared to existing conditions, the increased floodplain area, increased frequency of inundation, and the wide floodplains under Alternative D, combined with Restoration Flows, would have a **beneficial** effect on the aquatic food web.

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6.0 Biological Resources – Vegetation

This chapter describes the environmental and regulatory setting for vegetation and special-status plants in the Project area, analyzes the environmental consequences associated with the Project alternatives, and identifies impacts and mitigation measures.

6.1 Environmental Setting

Biological resources addressed in this section include special-status plants, vegetation alliances, and non-native invasive plant species. Existing conditions are the baseline biological resource conditions that existed when the Notice of Intent and Notice of Preparation were filed, which was July 2009. However, field data were collected at later dates, after the start of Interim Flows. Therefore, the best available information to describe existing conditions was typically from the period after the start of Interim Flows.

6.1.1 Regional Setting

The San Joaquin River downstream of Friant Dam is a deeply incised channel that discharges to the San Joaquin Valley floor near Gravelly Ford. The San Joaquin River and its main tributaries in their historic natural state meandered across alluvial fans along the main axis of the valley. The river distributed higher flows into a complex network of sloughs that branched off both sides of the river. It flowed through a flat, homogeneous topography and supported a limited riparian forest. The flat valley floor surrounding the riparian forest supported extensive wetlands dominated by tule marsh. Riparian forest zones were present along the margins of the main channel and were not very extensive (The Bay Institute 1998).

Near Mendota, the San Joaquin River merged with Fresno Slough, which was part of an intricate slough system that exchanged water between the Tulare Lake Basin and the San Joaquin River. Downstream from Mendota, the San Joaquin River flowed through a network of large slough channels supporting riparian woodlands, tule marshes, and backwater ponds until the Merced River confluence. Downstream from this point, the floodplain was more confined and the river exhibited a highly sinuous pattern of meanders with a complex of oxbow lakes, backwater sloughs, ponds, and sand bars. In its lower sections just upstream from the Delta, the river formed low natural levees approximately 6 feet high (The Bay Institute 1998).

The San Joaquin River has changed dramatically since the early 20th century. The river is now largely confined within constructed levees and bounded by agricultural and urban development, flows are regulated through dams and water diversions, and floodplain habitats have been fragmented and reduced in size and diversity (McBain and Trush 2002). As a result, the riparian communities and associated wildlife have substantially changed from historic conditions (Bureau of Reclamation [Reclamation] 1998a).

Vegetation in the Restoration Area has been heavily impacted by levee construction, conversion of riparian areas into agricultural fields, ongoing agricultural practices, livestock grazing, introduction of non-native invasive plant species, and the quantity and duration of river flows. In typical water years, Friant Dam is operated to store flows in the spring for water deliveries during the summer months, resulting in abrupt decreases in stream flow. A rapid rate of drawdown generally prevents the establishment of new willow, cottonwood, and other riparian tree and shrub species. Water diversions upstream of the Project area have caused substantial loss of riparian vegetation in several reaches of the river (e.g., Reaches 2 and 4A), and urban and agricultural development have caused a gradual loss in the area available for riparian habitat (Reclamation 1998a).

6.1.2 Project Setting

The Project area includes Reach 2B and a small portion of Reach 3, situated along approximately 12 miles of the San Joaquin River from the Chowchilla Bifurcation Structure to 2 miles downstream of Mendota Dam. Figure 1-2 of Chapter 1.0, "Introduction," includes a map of the Project area.

The river reach within the Project area consists primarily of a sandy river channel constricted by levees on both sides. The river is lined with narrow bands of riparian vegetation that extend from sparse and narrow riparian terraces to the top of the levees. Until the recently implemented Interim Flow regime, the portion of the Project area upstream of San Mateo Avenue was dry most of the year and the portion downstream was inundated by Mendota Pool.

Vegetation Alliances

Riparian vegetation types on levee banks, narrow terraces, small floodplains, and within the active channel include:

- Riparian forests and woodlands.
- Riparian thickets.
- Riparian scrub.
- Grasslands and herbaceous fields.
- Marshes and wet meadows.

These general vegetation types are subdivided into vegetation alliances based on the predominant species present. Table 6-1 provides a cross-reference between the special-status vegetation alliances recognized by the California Department of Fish and Wildlife (DFW) (2009) and found in the Project area, the former sensitive natural community types (DFW 2003), and plant community types (Holland 1986) used to classify vegetation in California. For the purpose of this document, special-status vegetation alliances are defined as natural communities that are considered vulnerable, imperiled, or critically imperiled, in California (State ranks 1-3 and riparian and wetland alliances). DFW currently requires that the vegetation alliance nomenclature based on the current system be used when evaluating project impacts (DFW 2009, Hickson 2009). Most types of wetlands and riparian communities are considered special-status vegetation alliances due to their limited distribution in California.

Table 6-1.
Cross-Reference of Vegetation Alliance, Natural Community, and Plant Community Types

Vegetation Alliance Common/ Scientific Name (DFW 2009)	Natural Community (DFW 2003)	Plant Community (Holland 1986)
Riparian Forest and Woodland Vegetation Alliances		
Fremont cottonwood forest/ *Populus fremontii* alliance	Fremont Cottonwood Riparian Forests and Woodlands	Cottonwood Riparian Forest
Oregon ash groves/ *Fraxinus latifolia* forest alliance	Oregon Ash Riparian Forest	Mixed Riparian Forest
Valley oak woodland/ *Quercus lobata* woodland alliance	Valley Oak Forests and Woodlands	Valley Oak Riparian Forest
Riparian Thicket Alliances		
Black willow thickets/ *Salix gooddingii* alliance	Black Willow Riparian Forests and Woodlands	Willow Riparian Forest
Buttonwillow thickets/ *Cephalanthus occidentalis* alliance	Buttonbush Scrub	Riparian Scrub
Red willow thickets/ *Salix laevigata* woodland alliance	Red Willow Riparian Forests	Willow Riparian Forest
Arrow weed thickets/ *Pluchea sericea* shrubland alliance	Arrow Weed Scrubs	Riparian Scrub
Riparian Scrub Alliances		
Blue elderberry stands/ *Sambucus nigra* shrubland alliance	Elderberry Scrub and Savanna	Elderberry Savanna
California rose briar patches/ *Rosa californica* alliance	California Rose Riparian Scrub	Riparian Scrub
Spinescale scrub/ *Atriplex spinifera* alliance	Spinescale Scrub	Alkali Sink
Grassland and Herbaceous Field Alliances		
Tar plant fields/ *Centromadia pungens* or other species herbaceous alliance	Tar Plant Fields	Grassland and Pasture
Creeping rye grass turfs/ *Leymus triticoides* herbaceous alliance	Creeping Ryegrass Grassland	Grassland and Pasture
Salt grass flats/ *Distichlis spicata* herbaceous alliance	Saltgrass	Emergent Wetland
Marsh and Wet Meadow Alliances		
California bulrush marsh/ *Schoenoplectus californicus* herbaceous alliance	California Bulrush Wetland	Emergent Wetland
Pale spike rush marshes/ *Eleocharis macrostachya* herbaceous alliance	Spikerush	Emergent Wetland
Yerba mansa meadows/ *Anemopsis californica* herbaceous alliance	Alkali Meadow	Alkali Sink
Alkali heath marsh/ *Frankenia salina* alliance	Alkali Heath Dwarf Scrub	Alkali Sink

Table 6-2 below lists special-status vegetation alliances observed in the Project area, their extent, and vegetation alliance state ranking. DFW ranks vegetation alliances based on their rarity, vulnerability to disturbance, and association with sensitive habitat types such as streams and wetlands.

Table 6-2.
Special-Status Vegetation Alliances in the Project Area

Common Name	Scientific Name	State Rank	Area (acres)
Riparian Forest and Woodland Alliances			
Fremont cottonwood forest	*Populus fremontii* alliance	S3.2/Riparian	90.9
Oregon ash groves	*Fraxinus latifolia* forest alliance	S3.2/Riparian	7.1
Valley oak woodland	*Quercus lobata woodland* alliance	S3 to S2	0.2
Riparian Thicket Alliances			
Black willow thickets	*Salix gooddingii* alliance	S3/Riparian	146.8
Buttonwillow thickets	*Cephalanthus occidentalis* alliance	S2/Riparian	1.6
Red willow thickets	*Salix laevigata* woodland alliance	S3/Riparian	0.6
Arrow weed thickets	*Pluchea sericea* shrubland alliance	S3/Wetland	0.4
Riparian Scrub Alliances			
Blue elderberry stands	*Sambucus nigra* shrubland alliance	S3	76.4
California rose briar patches	*Rosa californica* alliance	S3/Riparian	13.4
Spinescale scrub	*Atriplex spinifera* alliance	S3	0.7
Silver bush lupine scrub	*Lupinus albifrons* shrubland alliance	S4	4.1
Grassland and Herbaceous Field Alliances			
Tar plant fields	*Centromadia pungens* or other species herbaceous alliance	S2	35.4
Creeping rye grass turfs	*Leymus triticoides* herbaceous alliance	S3/Riparian	6.2
Salt grass flats	*Distichlis spicata* herbaceous alliance	S4/Wetland	2.3
Marsh and Wet Meadow Alliances			
California bulrush marsh	*Schoenoplectus californicus* herbaceous alliance	S4/Wetland	47.0
Pale spike rush marsh	*Eleocharis macrostachya* herbaceous alliance	S4/Wetland	1.6
Yerba mansa meadows	*Anemopsis californica* herbaceous alliance	S2/Wetland	0.8
Alkali heath marsh	*Frankenia salina* alliance	S3/Wetland	0.7

Vegetation Alliance State Ranking by DFW:
S1 = statewide critically imperiled
S2 = statewide imperiled
S3 = statewide vulnerable
S3.2 = vulnerable and threatened – at moderate risk of extinction or elimination in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors.
S4 = statewide apparently secure
S5 = secure

Riparian Forest and Woodland

Riparian forest and woodland alliances in the Project area include Fremont cottonwood forest, Oregon ash groves, and valley oak woodland.

Fremont cottonwood forest (*Populus fremontii* alliance) is a multilayered riparian forest occurring on high floodplain areas along the San Joaquin River. Older and decadent stands of cottonwood riparian forest also exist in areas that were formerly active floodplains, but are now on functional terraces because of the reduction in high flow regime following the completion of Friant Dam. Fremont cottonwood forests are typically up to 80 feet tall and the canopy cover is open in woodlands to continuous in forests. Fremont cottonwood is the dominant or co-dominant species in the tree canopy with other trees such as Oregon ash (*Fraxinus latifolia*), California black walnut (*Juglands californica*), California sycamore (*Platanus racemosa*), and black willow (*Salix gooddingii*). California wild grape (*Vitis californica*) is a conspicuous vine usually growing within the canopy of Fremont cottonwoods. The mid-story is typically dominated by open to intermittent shade-tolerant shrubs and small trees. Other shrubby species of willow such as sandbar willow (*Salix exigua*) may also be present within the mid-story along the sunny edges of the forest. The understory is typically dominated by native grasses and forbs, such as creeping wildrye (*Leymus triticoides*), stinging nettle (*Urtica dioica* ssp. *holosericea*), and at the lower mesic edges, Santa Barbara sedge (*Carex barbarae*). Fremont cottonwood forest occurs on 66 acres in the Project area.

Oregon ash groves (*Fraxinus latifolia* forest alliance) occur where Oregon ash is the dominant or co-dominant species in the tree canopy with other riparian trees. Oregon ash groves are typically up to 50 feet tall and the canopy cover is open to continuous. Shrubs are sparse to intermittent because of heavy shade under the dense canopy. The herbaceous layer is sparse and variable. The alliance occurs on terraces and levee slopes with alluvial soils in the Project area.

Valley oak woodlands (*Quercus lobata* woodland alliance) have valley oak as the dominant or co-dominant tree. Although this alliance was found in the Project area, only individual trees were observed and these were possibly planted. The alliance occurs on the south side of Mendota Pool in soils that may be seasonally saturated or intermittently flooded during very high flows.

Riparian Thickets

Riparian thicket vegetation alliances in the Project area include black willow thickets, buttonwillow thickets, red willow thickets, and arrow weed thickets.

Black willow thickets (*Salix gooddingii* alliance) have black willow as the dominant or co-dominant species in the tree canopy with other trees such as white alder, Fremont cottonwood, red willow, arroyo willow, shining willow and yellow willow (*Alnus rhombifolia, Populus fremontii, Salix laevigata, S. lasiolepis, S. lucida* ssp. *lasiandra,* and *S. lutea*). In the Project area, black willow thickets are typically up to 60 feet tall and the alliance canopy cover is open to continuous. Shrubs are open to continuous with blue elderberry (*Sambucus nigra*), coyote brush (*Baccharis pilularis*), and mulefat (*B.*

salicifolia). The alliance occurs in riparian corridors, rocky floodplains, small intermittent streams, springs, and seeps.

Buttonwillow thicket (*Cephalanthus occidentalis* alliance) is a vegetation alliance where buttonwillow shrubs are dominant in the canopy or co-dominant with black willow, shining willow (*S.lucida* ssp. *lasiandra*), and sandbar willow (*S. exigua*). Buttonwillow shrubs are typically less than 20 feet tall and the alliance provides open, intermittent, or continuous canopy cover. The herbaceous understory layer is sparse or grassy. The alliance occurs in seasonally flooded basins with slowly moving or stagnant water and in floodplains with subsurface water at the end of the growing season. Many small stands of buttonwillow occur on the lower margins of the levee banks throughout most of the Project area and these stands often form narrow strips along levees.

Red willow thicket (*Salix laevigata* woodland alliance) is a vegetation alliance where red willow is the dominant or co-dominant in the tree canopy with other trees. In the Project area, these can be Fremont cottonwood, black willow, and blue elderberry. Red willow thickets are up to 70 feet tall and the alliance canopy cover is open to continuous. The shrub layer is open to continuous. The alliance occurs in the Project area only sparsely with other riparian trees on floodplains and low-gradient depositions along the river.

Arrow weed thickets (*Pluchea sericea* shrubland alliance) have arrow weed as the dominant or co-dominant species with other plants in the shrub canopy. In the Project area, they can be mulefat, sandbar willow, and dogbane. The alliance occurs along stream borders or seasonally flooded areas. Arrow weed is a wetland plant. Several large areas of this vegetation alliance were observed in the Project area in low-lying areas that are seasonally flooded on the south bank in the meander loop between River Mile (RM) 207 and RM 208.

Riparian Scrub

Riparian scrub alliances in the Project area include the blue elderberry stands, California rose briar patches, and spinescale scrub vegetation alliances.

Blue elderberry stands (*Sambucus nigra* shrubland alliance) have blue elderberry as the dominant or co-dominant species in the shrub canopy with other shrubs such as mugwort, coyote brush, mulefat, toyon, tobacco tree, sandbar willow, poison oak and California grape. Emergent trees, such as California walnut, Fremont cottonwood, and Oregon ash may occur. In the Project area, blue elderberry stands are typically up to 20 feet tall and the canopy cover is open. The herbaceous layer is variable and usually grassy. The alliance occurs primarily on levee banks and in meander loop bottomlands. The blue elderberry is especially abundant in the southeast, undeveloped pastures of the Project area and in the meander loops between RM 213 and RM 216 near the Chowchilla Bifurcation Structure. The alliance occurs on sand and gravelly soil alluvium that is intermittently flooded. Blue elderberry shrubs in the Project area are habitat for the Federally-listed, threatened valley elderberry longhorn beetle.

California rose briar patches (*Rosa californica* alliance) have California rose as the dominant or co-dominant species in the shrub canopy with other shrubs such as coyote

brush, sandbar willow, blue elderberry, and mulefat. California rose briar patches are typically up to 7 feet tall and the cover is typically very dense and continuous. The herbaceous layer is open and sparse because of heavy shading. The alliance occurs on levee banks throughout the reach on soils that are either mixed coarse alluvium or levee import.

Spinescale scrub *(Atriplex spinifera* alliance) has spinescale as the dominant or co-dominant species in the shrub canopy with other shrubs such as alkali heath (*Frankenia salina)* or mulefat. Spinescale scrub is typically up to 7 feet tall and the canopy cover is open. The herbaceous layer is variable with seasonal annuals reaching high cover. The alliance is scattered in several sandy areas high above the current water surface.

Grasslands and Herbaceous Fields

Grassland and herbaceous field alliances in the Project area include tar plant fields, creeping rye grass turfs, and salt grass flats.

Tarplant fields (*Centromadia pungens* herbaceous alliance) have tarplant as dominant to conspicuous in the herbaceous layer. Tarplant is typically lower than 2 feet and the cover is intermittent to continuous. The alliance occurs in vernally wet habitats, including alkaline flats subjected to periodic or intermittent water inundation. It is common in and near the meander loop between RM 207 and RM 208 that is now typically flooded in the winter. It occurs here on soils that are finer-textured, silty alluvium that is poorly drained. Common tarplant often covers large areas.

Creeping rye grass turfs (*Leymus triticoides* herbaceous alliance) has creeping rye as the dominant or co-dominant species in the herbaceous layer with other herbs such as yerba mansa (*Anemopsis californica*), salt grass (*Distichlis spicata*), and barley grasses (*Hordeum* species) on poorly drained floodplains, moderately moist flat to sloping topography, levee slopes and marsh margins.

Salt grass flats (*Distichlis spicata* herbaceous alliance) has salt grass is the dominant or co-dominant species in the herbaceous layer with other herbs such as yerba mansa, creeping rye, alkali heath, and barley grasses on poorly drained floodplains, wet meadows, and marsh margins.

Marsh and Wet meadow

Marsh and wet meadow alliances include California bulrush marsh, pale spike rush marsh, yerba mansa meadow and alkali heath marsh.

California bulrush marsh (*Schoenoplectus californicus* herbaceous alliance) has California bulrush as the dominant species. It occurs with hardstem bulrush (*Scirpus acutus*), broadleaf cattail (*Typha latifolia*), narrowleaf cattail (*Typha angustifolia*), and river bulrush (*Scirpus fluviatilis*). It is an emergent species that occurs along the edges of Mendota Pool. It also forms numerous vegetation islands in low velocity reaches of the river.

Pale spike rush marsh (*Eleocharis macrostachya* herbaceous alliance) is a vegetation alliance where pale spike rush is the dominant species.

Yerba mansa meadows (*Anemopsis californica* herbaceous alliance) have yerba mansa as dominant or co-dominant with other herbaceous species such as alkali heath (*Frankenia grandiflora*), salt grass (*Distichlis spicata*), western goldenrod (*Euthamia occidentalis*), prickly lettuce (*Lactuca serriola*), and creeping rye grass (*Leymus triticoides*). Yerba mansa meadows occur on alkaline or saline soils on stream terraces and floodplains adjacent to the river. Yerba mansa is a wetland plant that almost always occurs in wetland areas. The alliance was observed in well preserved riparian meadows on the south bank of the river in areas where the river backs up behind Mendota Dam.

Alkali heath marsh (*Frankenia salina* alliance) has alkali heath as the dominant or co-dominant species in the herbaceous or subshrub layer with other species such as salt grass *(Distichlis spicata*) and creeping rye grass (*Leymus triticoides*). Alkali heath marsh is typically composed of herbs and subshrubs up to 2 feet tall and the alliance canopy cover is open to continuous. In the Project area, it occurs on soils that are typically alkaline, saline, sandy to clayey alluvium.

Special-Status Plants

Special-status plant species include those that meet any one of the following definitions:

- Listed or candidates for listing under the Federal Endangered Species Act (ESA) (50 Code of Federal Regulations [CFR] §17.12).
- Listed or candidates for listing by the State as threatened or endangered under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.).
- Listed as rare under the California Native Plant Protection Act (CNPPA) (Fish & G. Code, § 1900 et seq.).
- Species considered by the California Native Plant Society (CNPS) to be "rare, threatened or endangered in California" (Lists 1A, 1B and 2).
- Other plant species that are considered by the scientific community to meet the definition of rare or endangered plants under the California Environmental Quality Act (CEQA) section 15380.

Special-status plant species evaluated for the potential to occur in the Project area are listed in Table 6-3. The table includes field survey results and an evaluation of the potential for the species to occur in the portions of the Project area that were not accessible for field surveys. Table 6-3 includes an assessment of potential for special-status plants to occur in these areas based on generally known habitat characteristics and the range and distribution of plant species. No special-status plant species were identified during field surveys.[1]

[1] Special-status plant surveys took place from August 2010 through July 2011 where access had been granted in the Project area. Detailed vegetation alliance surveys were conducted on December 15, 2009, and on May 19, 2010.

Table 6-3.
Federal-, State-, or CNPS-Listed Plant Species with a Potential to Occur in the Project Area

Scientific Name **Common Name**	**Federal/ State/ CNPS Status**	**Habitat/ Communities**	**Potential to Occur in inaccessible Project Areas and Survey Results**	**Blooming Period/ Survey Date**
Atriplex cordulata heartscale	--/--/1B.2	Chenopod scrub, meadows and seeps, and sandy/saline or alkaline valley and foothill grassland	Moderate potential to occur based on marginal habitat, disturbance, and reported observations within 5 miles of the Project area Not observed during surveys.	Apr-Oct/ late April
Atriplex depressa brittlescale	--/--/1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, and alkaline or clay vernal pools	Moderate potential to occur based on marginal habitat, disturbance, and reported observations within 10 miles of the Project area Not observed during surveys.	Apr-Oct/ late April
Atriplex minuscula lesser saltscale	--/--/1B.1	Chenopod scrub, playas, and alkaline or sandy valley and foothill grassland	Moderate potential to occur based on absence during accessible area surveys, little suitable habitat & disturbance. However, CNDDB observations within 10 miles of the Project area. Not observed during surveys.	May-Oct/ mid-June
Atriplex persistens vernal pool smallscale	--/--/1B.2	Alkaline vernal pools	Low potential to occur based on absence during accessible area surveys, no alkaline vernal pools & disturbance. However, CNDDB observations within 10 miles of the Project area. Not observed during surveys.	Jun-Oct/ mid-June
Atriplex subtilis subtle orache	--/--/1B.2	Valley and foothill grassland	Moderate potential to occur based on absence during accessible area surveys, little suitable habitat & disturbance. However, CNDDB observations within 5 miles of the Project area. Not observed during surveys.	Jun-Aug (Oct*) *uncommon /mid-June
Atriplex vallicola Lost Hills crownscale	--/--/1B.2	Chenopod scrub, valley and foothill grassland, and alkaline vernal pools	Moderate potential to occur based on absence during accessible area surveys, little suitable habitat & disturbance. However, CNDDB observations within 5 miles of the Project area. Not observed during surveys.	Apr-Aug/ late April

Table 6-3.
Federal-, State-, or CNPS-Listed Plant Species with a Potential to Occur in the Project Area

Scientific Name **Common Name**	**Federal/ State/ CNPS Status**	**Habitat/ Communities**	**Potential to Occur in inaccessible Project Areas and Survey Results**	**Blooming Period/ Survey Date**
Castilleja campestris ssp. *succulenta* succulent owl's-clover	FT/SE/1B.2	Vernal pools (often acidic)	Very low potential to occur based on absence during accessible area surveys, no suitable habitat & disturbance. Some potential based on elevation. Not observed during surveys.	Apr-May/ late April
Caulanthus californicus California jewel-flower	FE/SE/1B.1	Chenopod scrub, pinyon and juniper woodland, and sandy valley and foothill grassland	Very low potential to occur based on absence during accessible area surveys, little suitable habitat & disturbance. Not observed during surveys.	Feb-May/ mid-March
Cordylanthus palmatus palmate-bracted bird's-beak	FE/SE/1B.1	Chenopod scrub and alkaline valley and foothill grassland	Low potential to occur based on absence during accessible area surveys, little suitable habitat & disturbance. However, CNDDB observations within 5 miles of the Project area. Not observed during surveys.	May-Oct/ mid-June
Delphinium recurvatum recurved larkspur	--/--/1B.2	Chenopod scrub, cismontane woodland, and alkaline valley and foothill grassland	Low potential to occur based on absence during accessible area surveys, little suitable habitat, & disturbance. However, CNDDB observations within 10 miles of the Project area. Not observed during surveys.	Mar-Jun/ mid-March
Imperata brevifolia California satintail	--/--/2.1	Chaparral, coastal scrub, Mojavean desert scrub, meadows and seeps (often alkali), and mesic riparian scrub	Low potential to occur based on absence during accessible area surveys, little suitable habitat & disturbance. Elevation is suitable. Not observed during surveys.	Sep-May/ mid-March
Layia munzii Munz's tidy tips	--/--/1B.2	Chenopod scrub and alkaline clay valley and foothill grassland	Moderate potential to occur based on absence during accessible area surveys, little suitable habitat & disturbance. However, CNDDB observations within 5 miles of the Project area. Not observed during surveys.	Mar-Apr/ mid-March

Table 6-3.
Federal-, State-, or CNPS-Listed Plant Species with a Potential to Occur in the Project Area

Scientific Name **Common Name**	**Federal/ State/ CNPS Status**	**Habitat/ Communities**	**Potential to Occur in inaccessible Project Areas and Survey Results**	**Blooming Period/ Survey Date**
Leptosiphon serrulatus Madera leptosiphon	--/--/1B.2	Cismontane woodland and lower montane coniferous forest	No potential to occur based on absence during accessible area surveys, no suitable habitat, lower elevation & disturbance. Not observed during surveys.	Apr-May/ late April
Monolopia congdonii San Joaquin woollythreads	FE/--/1B.2	Chenopod scrub and sandy valley and foothill grassland	Moderate potential to occur based on absence during accessible area surveys & disturbed habitat. However, CNDDB observations within 10 miles of the Project. Not observed during surveys.	Feb-May/ mid-March
Orcuttia inaequalis San Joaquin Valley Orcutt grass	FT/SE/1B.1	Vernal pools	Very low potential to occur based on absence during accessible area surveys, no vernal pools & disturbance. Not observed during surveys.	Apr-Sep/ late April
Orcuttia pilosa hairy Orcutt grass	FE/SE/1B.1	Vernal pools	Very low potential to occur based on absence during accessible area surveys, no vernal pools & disturbance. Not observed during surveys.	May-Sep/ mid-June
Sagittaria sanfordii Sanford's arrowhead	--/--/1B.2	Assorted shallow freshwater marshes and swamps	Moderate potential to occur based on absence during accessible area surveys & disturbance. However, CNDDB observations within 5 miles of the Project area and suitable habitat. Not observed during surveys.	May-Oct/ mid-June
Tropidocarpum capparideum caper-fruited tropidocarpum	--/--/1B.1	Alkaline hills valley and foothill grassland	Low potential to occur based on absence during accessible area surveys, little suitable habitat & disturbance. Not observed during surveys.	Mar-Apr/ mid-March

Key:
CNDDB = California Natural Diversity Database
FE = federally endangered
SE = State endangered
1B.1 = California Rare Plant Rank 1B (rare, threatened, or endangered plant), seriously threatened in California
1B.2 = California Rare Plant Rank 1B (rare, threatened, or endangered plant), fairly threatened in California
2.1 = California Rare Plant Rank 2 (rare, threatened, or endangered in California, but more common elsewhere)
-- = not listed

Non-Native Invasive Plants

Non-native invasive plants are species that are not native to the region, persist without human assistance, and adversely affect areas where they colonize because they outcompete or exclude more desirable native species, reduce agricultural productivity, or have other impacts (Davis and Thompson 2000). The term "invasive plant" differs from the classification terms "nonnative," "exotic," or "introduced plant" because it describes those non-native plant species that displace native species on a large enough scale to alter habitat functions and values. The California Invasive Plant Council (Cal-IPC) maintains a list of non-native invasive plant species considered invasive in California. The term "noxious weed" is used by government agencies for non-native plants that have been defined as pests in agriculture by law or regulation (California Department of Food and Agriculture [CDFA] 2012). Many invasive noxious trees and shrubs that have the ability to occupy channel and floodplain surfaces threaten river floodway capacity, and substantial cost and resources are required to remove and control large infestations.

Invasive plant species may interfere with the success of Restoration actions because of their ability to rapidly colonize new habitats and prevent the establishment of desirable native vegetation. Field surveys identified several invasive plant species in the Project area. Table 6-4 lists these species and indicates the degree of their invasiveness based on CDFA and Cal-IPC criteria. Of the invasive plant species observed in the Project area, the following have a Cal-IPC high rating (indicating a potential for severe ecological impacts): barbed goatgrass, giant reed, red brome, cheatgrass, yellow-star thistle, English ivy, broad-leafed pepper, Himalayan blackberry, small-flower tamarisk, saltcedar, and spotted knapweed. The following invasive plant species were also observed nearby or upstream and have a Cal-IPC high rating: red sesbania, water hyacinth, and spongeplant.

Table 6-4.
Invasive Plant Species Observed in the Project Area

Scientific Name	Common Name	Invasiveness
Acroptilon repens	Russian knapweed	CDFA List B, Cal-IPC moderate
Aegilops triuncialis	barb goatgrass	CDFA List B, Cal-IPC high
Ailanthus altissima	tree-of-heaven	Cal-IPC moderate
Arundo donax	giant reed	Cal-IPC high
Atriplex semibacchata	Australian saltbush	Cal-IPC moderate
Avena barbata	slender wild oats	Cal-IPC moderate
Avena fatua	common wild oats	Cal-IPC moderate
Brassica nigra	black mustard	Cal-IPC moderate
Bromus diandrus	ripgut brome	Cal-IPC moderate
Bromus madritensis ssp. *rubens*	red brome	Cal-IPC high
Bromus tectorum	downy brome, cheatgrass	Cal-IPC high
Carduus pycnocephalus	Italian thistle	CDFA List C, Cal-IPC moderate
Centaurea maculosa	spotted knapweed	CDFA List A, Cal-IPC high
Centaurea solstitialis	yellow-star thistle	CDFA List C, Cal-IPC high
Cirsium vulgare	bull thistle	Cal-IPC moderate
Conium maculatum	poison hemlock	Cal-IPC moderate
Cynara cardunculus	artichoke thistle, cardoon	Cal-IPC moderate

Table 6-4.
Invasive Plant Species Observed in the Project Area

Scientific Name	Common Name	Invasiveness
Cynodon dactylon	Bermuda grass	Cal-IPC moderate
Ficus carica	edible fig	Cal-IPC moderate
Hedera helix	English ivy	Cal-IPC high
Hirschfeldia incana	Mediterranean hoary mustard	Cal-IPC moderate
Hordeum murinum ssp. *murinum*	foxtail barley	Cal-IPC moderate
Lepidium latifolium	broad-leafed pepper (i.e., perennial pepperweed)	CDFA List B, Cal-IPC high
Lolium multiflorum	Italian rye grass	Cal-IPC moderate
Lotus corniculatus	birdsfoot treefoil	Cal-IPC moderate
Lythrum hyssopifolium	hyssop loosestrife	Cal-IPC moderate
Mentha pulegium	pennyroyal	Cal-IPC moderate
Nicotiana glauca	tree tobacco	Cal-IPC moderate
Oxalis pes-caprae	Bermuda buttercup	Cal-IPC moderate
Phalaris aquatica	Harding grass	Cal-IPC moderate
Rubus discolor	Himalayan blackberry	Cal-IPC high
Rumex acetosella	sheep sorrel	Cal-IPC moderate
Sisymbrium irio	London rocket	Cal-IPC moderate
Tamarix parviflora	small-flower tamarisk	Cal-IPC high
Tamarix pentandra	saltcedar	Cal-IPC high
Torilis arvensis	hedge parsley	Cal-IPC moderate
Vulpia myuros	rattail fescue	Cal-IPC moderate
Washingtonia robusta	Washington fan palm	Cal-IPC moderate

Key:
Cal-IPC = California Invasive Plant Council
CDFA = California Department of Food and Agriculture
Cal-IPC high = severe ecological impacts on physical processes, plant and animal communities, and vegetation structure.
Cal-IPC moderate = substantial and apparent ecological impacts on physical processes, plant and animal communities, and vegetation structure
CDFA List A = either not known to be established in the State or is present in a limited distribution; recommended for exclusion and eradiacation
CDFA List B = widely distributed in some regions of the State; recommended for regional eradication
CDFA List C = widespread throughout the State; recommended for local eradication

6.2 Regulatory Setting

Federal, State, and local laws and regulations applicable to vegetation in the Project area include ESA, National Environmental Policy Act (NEPA), CESA, CEQA, CNPPA, which cover impacts to natural vegetation, sensitive communities, and rare plants, and Public Resources Code section 21083.4, which covers oak woodlands conservation and directs counties to describe and mitigate impacts to oak woodlands.

6.2.1 Federal

Federal Endangered Species Act of 1973 (50 CFR Part 17)

The ESA defines special-status plants as species listed or proposed for listing as threatened or endangered under the ESA, or candidates for possible future listing as threatened or endangered under the ESA (50 CFR §17.12).

Recovery Plan for Upland Species of the San Joaquin Valley, California

The Recovery Plan for Upland Species of California was released by U.S. Fish and Wildlife Service (USFWS) on September 30, 1998. This plan focuses on 34 species of plants and animals that occur in the San Joaquin Valley and that are either Federally-listed as threatened or endangered or are candidates for Federal listing or species of concern. The ultimate goal of the recovery plan is to delist the 11 endangered and threatened species addressed in the plan and ensure the long-term conservation of the other 23 species (USFWS 1998). The plan provides for both an ecosystem approach and a community-level strategy. While not regulatory in nature, the Recovery Plan would be taken into consideration when analyzing potential impacts on upland natural community habitats in the San Joaquin Valley to ensure that projects do not prevent or impair the plan's future long-term implementation success. It is also used by the USFWS to determine recommendations and requirements during endangered species consultation for these species.

Invasive Species (Executive Order 13112)

Executive Order 13112 requires Federal agencies to perform measures to minimize the spread of invasive species and to reintroduce native species where possible. This order applies to "actions that may affect the status of invasive species" (Section 2). Federal agencies must pursue the duties mandated under the order in consultation with the Invasive Species Council (Section 2(b)). The order also requires agencies to formulate their own Invasive Species Management Plan (Section 5).

6.2.2 State of California

Vegetation Alliances

DFW and its collaborators use a suite of factors to assess the conservation ranking of vegetation alliances. All California vegetation alliances are described, ranked, and assembled into a list. DFW then issues the ranked list of California vegetation alliances for the public's use, for California Natural Diversity Database (CNDDB) mapping efforts, and for project impact assessment. The current version of the List of California Vegetation Alliances was released in December 2009 (DFW 2009).

Conservation ranks in this list provide an estimate of the risk of elimination for vegetation alliances. They are based on a one to five scale rank (NatureServe Explorer 2009), ranging from critically imperiled (1) to demonstrably secure (5). Status is assessed and documented at three distinct geographic scales of the assessment (G = Global, N = National, and S = Subnational or State).

For the purpose of this document, special-status vegetation alliances (sensitive plant communities) are defined as natural communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental impacts of projects. The current version of the List of California Vegetation Alliances (DFW 2009) indicates vegetation alliances of high inventory priority for conservation status, which are those globally or State ranked 1-3 (critically imperiled, imperiled and vulnerable). Most types of wetlands and riparian communities are considered special-status vegetation alliances due to their limited distribution in California. These high-priority vegetation alliances often contain special-status plants.

Special-Status Plants

California laws and regulations define special-status plants as those:

- Listed or candidates for listing by the State as threatened or endangered under CESA (Fish & G. Code, § 2050 et seq.).
- Listed as rare under CNPPA (Fish & G. Code, § 1900 et seq.).
- Meet the definition of rare or endangered under CEQA § 15380, subds. (b) and (d).

California Endangered Species Act (Fish & G. Code, § 2050 et seq.) CESA defines special-status plants as species that are listed or are candidates for listing by the State as threatened or endangered under CESA (Fish & G. Code, § 2050 et seq.). A species, subspecies, or variety of plant is endangered when the prospects of its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors (Fish & G. Code, § 2062). A plant is threatened when it is likely to become endangered in the foreseeable future in the absence of special protection and management measures (Fish & G. Code, § 2067).

California Native Plant Protection Act (Fish & G. Code, § 1900 et seq.) The CNPPA is intended to preserve, protect, and enhance endangered or rare native plants in the State. The CNPPA defines special-status plants as those listed as rare under CNPPA (Fish & G. Code, § 1900 et seq.). A plant is rare when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish & G. Code, § 1901).

California Environmental Quality Act section 15380, subdivisions (b) and (d). CEQA defines special-status plants as those that meet the definition of rare or endangered under CEQA section 15380, subdivisions (b) and (d). Species that may meet the definition of rare or endangered include the following:

- Species considered by CNPS to be “rare, threatened or endangered in California” (Lists 1A, 1B and 2).
- Species that may warrant consideration on the basis of local significance or recent biological information.

- Some species included on the CNDDB Special Plants, Bryophytes, and Lichens List (DFW 2015).

California Native Plant Society Species Designations. CNPS is a statewide nonprofit organization that seeks to increase understanding of California's native flora, and to preserve this rich resource for future generations. CNPS has developed and maintains lists of vascular plants of special concern in California. CNPS-listed species have no formal legal protection, but the value and importance of these lists are widely recognized. CNPS List 1 and 2 species are considered rare plants pursuant to section 15380 of CEQA, and it is recommended that they be fully considered while preparing environmental documents relating to CEQA.

6.2.3 Regional and Local

Regional and local regulations or protected plant lists may define special-status plant species that could meet the definition of rare or endangered plants under CEQA section15380. Regional and local plans and policies pertaining to vegetation are discussed below.

Riparian Habitat Joint Venture

The Riparian Habitat Joint Venture (RHJV) was initiated in 1994 and includes signatories from 18 Federal, State, and private agencies. The RHJV promotes conservation and the restoration of riparian habitat to support native bird populations through three goals:

- Promote an understanding of the issues affecting riparian habitat through data collection and analysis.
- Double riparian habitat in California by funding and promoting on-the-ground conservation projects.
- Guide land managers and organizations to prioritize conservation actions.

RHJV conservation and action plans are documented in the Riparian Bird Conservation Plan (RHJV 2004). The conservation plan targets 14 "indicator" species of riparian-associated birds and provides recommendations for habitat protection, restoration, management, monitoring, and policy. The report notes habitat loss and degradation as one of the most important factors causing the decline of riparian birds in California.

County Plans

Pertinent county plans include the Fresno and Madera county general plans.

Fresno County General Plan

The Fresno County General Plan was updated in October 2000. In the Project area and vicinity, Fresno County's land use jurisdiction lies south and west of the San Joaquin River centerline, through Reaches 1, 2, and 3, and into Reach 4A. The general plan identifies 27 primary land use designations (defined in terms of allowable uses and intensity standards) and three overlay designations (an overlay land use designation modifies the policies, standards, or procedures established for the underlying primary

land use designation). One of the three overlay designations is for the San Joaquin River corridor.

The general plan also identifies as a priority the protection and enhancement of water quality and quantity in Fresno County's streams, creeks, and groundwater basins through the protection of floodplain lands.

Policies in the general plan seek to protect natural areas, particularly riparian and wetland habitats, in the county, and to preserve habitat diversity in Fresno County through restoring and enhancing habitats that support fish and wildlife species so that populations are maintained at viable levels. Notably, the general plan seeks to preserve and enhance the San Joaquin River corridor areas adjoining the county's river corridor by avoiding adverse impacts from development and encouraging environmentally friendly recreational and agricultural activities. One policy in the general plan directs the county to require riparian protection zones around natural watercourses, recognizing that these areas provide highly valuable wildlife habitat. Another policy recommends the acquisition (through fee acquisition or protective easements, often in cooperation with other local, State, and Federal agencies and private entities) of creek corridors, wetlands, and areas rich in wildlife, or of a fragile ecological nature as public open space where such areas cannot be effectively preserved through the regulatory process. The general plan prioritizes the protection of wetlands, riparian habitat, and meadows because they are recognized as essential habitats for birds and wildlife, and it requires a minimum 200-foot-wide wildlife corridor along particular stretches of the San Joaquin River and Kings River, whenever possible.

Madera County General Plan Policy Document

The Madera County General Plan Policy Document, adopted in October 1995, is a stand-alone document that is part of the Madera County General Plan. In the Project area and vicinity, Madera County's land use jurisdiction lies northeast of the San Joaquin River centerline and continues downstream from Friant Dam through Reaches 1, 2, 3, and 4A.

One of the goals in the general plan is to protect and enhance the natural qualities of Madera County's streams, creeks, and groundwater, minimizing sedimentation and erosion of creeks and damage to riparian habitat. The general plan also prioritizes the protection of wetland communities and related riparian areas throughout Madera County as valuable resources, the protection of riparian zones around natural watercourses, and the conservation of remaining upland habitat areas adjacent to wetlands and riparian areas that are critical to the feeding or nesting of wildlife species associated with these wetland and riparian areas. One policy in the general plan directs the county to support the goals and policies of the San Joaquin River Parkway Master Plan to preserve existing habitat and maintain, enhance, or restore native vegetation to provide essentially continuous riparian and upland habitat for wildlife along the river between Friant Dam and the State Route (SR) 145 crossing.

The general plan also identifies a goal to protect, restore, and enhance habitats that support fish and wildlife species so as to maintain populations at viable levels, by protecting critical nesting and foraging areas, important spawning grounds, migratory

routes, waterfowl resting areas, oak woodlands, wildlife movement corridors, and other unique wildlife habitats critical to protecting and sustaining wildlife populations, and by ensuring the conservation of sufficiently large, continuous expanses of native vegetation to provide suitable habitat for maintaining abundant and diverse wildlife if this preservation does not threaten the economic well-being of the county. Another goal of the general plan is to preserve and enhance open space lands to maintain the natural resources of the county by supporting preservation and enhancement of natural land forms, natural vegetation, and natural resources (including wetland preserves, riparian corridors, woodlands, and floodplains) as open space. These open space and natural areas should be interconnected and of sufficient size to protect biodiversity, accommodate wildlife movement, and sustain ecosystems.

6.3 Environmental Consequences and Mitigation Measures

This section describes the effects that the Project Alternatives would have on special-status plants and vegetation alliances relative to the "No-Action conditions" in accordance with NEPA, and "existing conditions" based on CEQA requirements. The potential effects of each alternative are assessed with respect to significance criteria. Measures to avoid, minimize, or mitigate potential negative impacts are described. The Project Alternatives evaluated in this section are described in detail in Chapter 2.0, "Description of Alternatives." The potential impacts are summarized below.

6.3.1 Impact Assessment Methodology

Identification of Vegetation Resources in the Project Area

Existing biological resources were determined through review of scientific literature, existing data sources, and field surveys. Existing documents reviewed include:

- *Historical Riparian Habitat Conditions of the San Joaquin River — Friant Dam to the Merced River*, prepared by Jones & Stokes Associates, Inc. for U.S. Department of the Interior, Bureau of Reclamation (Reclamation), Fresno, California. April 1998 (Reclamation 1998a).
- *Analysis of Physical Processes and Riparian Habitat Potential of the San Joaquin River — Friant Dam to the Merced River*, prepared by Jones & Stokes Associates, Inc. for Reclamation, Fresno, California. October 1998 (Reclamation 1998b).
- *Riparian Vegetation of the San Joaquin River*, prepared by California Department of Water Resources (DWR) for Reclamation, May 2002 (DWR 2002).
- *San Joaquin River Restoration Study Background Report*, edited by McBain and Trush, December 2002 (McBain and Trush 2002).
- *Draft Mendota Pool Bypass and Reach 2B Improvements Project Technical Memorandum on Environmental Field Survey Results*, November 2011 (San Joaquin River Restoration Program [SJRRP] 2011a).

Permits to enter private property in the Project area to perform biological surveys were not obtained until summer of 2010, so biological fieldwork occurred in 2010 and 2011.

Field surveys were performed according to DFW protocol by walking those portions of the Project area where access was granted during the flowering period of special-status plants which had a potential to occur in the Project area. Plant species observed during field surveys are listed in *Mendota Pool Bypass and Reach 2B Improvements Project Technical Memorandum on Environmental Field Survey Results* (SJRRP 2011a, Attachment A). Species observed were identified to a level sufficient to determine their rarity status. These reviews and surveys provided the best available information about the biological resource condition closest to the baseline date.

Impact Evaluation Methodology

There were no special-status plants identified in the Project area. Therefore, the impact analysis focuses on vegetation alliances, and the potential impacts and beneficial effects on vegetation alliances that would result from implementing the Project Alternatives as compared to the No-Action Alternative and existing conditions.

The impact assessment is based on review and analysis of the following environmental concerns and topics:

- The extent and type of existing special-status vegetation alliances documented within the Project area that have the potential to be affected by the Project Alternatives.
- The quantity and quality of the special-status vegetation alliances proposed to be installed under the Project Alternatives and their development over time.
- The habitat requirements of special-status vegetation alliances under the Project Alternatives as compared to the No-Action Alternative and existing conditions.
- Long-term and temporary effects of the Project Alternatives.
- Direct, indirect, and cumulative effects of the Project Alternatives.
- Threats to special-status vegetation alliances including those from invasive plant species.
- The immediacy of potential effects.
- Recommended measures to avoid, minimize, or mitigate impacts.

Potential effects evaluated include direct, indirect, temporary, and long-term. Direct impacts include the direct removal or loss of vegetation within the footprint of ground disturbing actions. Indirect impacts are those incidental to Project implementation, such as changes in the hydrologic regime that results in different plant species establishment over time. Temporary impacts have a short duration and vegetation would be expected to recover or be restored within 3 to 5 years of Project implementation. An example would be the trimming and pruning of vegetation to install infrastructure, followed by vegetation re-growth. Long-term impacts involve the long-term alteration of vegetation or habitat such as the removal of mature trees or the conversion of backwater marsh area to active channel riparian habitat, resulting in permanent changes to vegetation type.

Key impact issues for special-status vegetation alliances are those that change vegetation health or survival. Where possible, impacts of stress are differentiated from impacts

resulting directly or indirectly in the mortality of riparian vegetation. Assumptions used in the impact assessment include:

- The distribution and abundance of special-status vegetation alliances would be proportional to the amount and quality of habitat available.
- Direct and indirect habitat modifications would reach maturity by the end of the planning horizon of the Project (2035).
- Site evolution would allow some habitats to form immediately or within several years of construction.
- Control and management of non-native invasive plant species would be implemented throughout the duration of Project construction and monitoring.

6.3.2 Significance Criteria

State CEQA Guidelines Appendix G and NEPA Council on Environmental Quality (CEQ) Regulations were used to develop the significance criteria. Under NEPA CEQ Regulations, impacts must be evaluated in terms of their context and intensity. Effects may be beneficial or adverse. An example of a beneficial effect would be the conversion of non-native grassland to a habitat with greater functions and values for special-status species. These factors have been considered when applying the State CEQA Guidelines, which state that the Project would result in a significant impact on vegetation resources if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species (including listed species) or on any riparian habitat or other special-status vegetation alliances identified in local or regional plans, policies, or regulations, or by DFW or USFWS. Examples of such effects are listed below.
  - Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, riparian wetlands, seasonal wetlands, etc.) through direct removal, filing, hydrological interruption, or other means.
  - Have the potential to degrade the quality of the environment, substantially reduce the habitat of a listed or sensitive plant species, threaten to eliminate a plant or plant community, reduce the number or restrict the range of a rare or endangered plant.
  - Eliminate important vegetation examples of major periods of California history.
- Conflict with any local policies or ordinances protecting biological resources, such as a conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan.
- Facilitate a substantial increase in distribution and abundance of invasive plants in the Project area.

6.3.3 Impacts and Mitigation Measures

This section provides an evaluation of the long-term and temporary effects of the Project alternatives on special-status vegetation alliances. It includes analyses of potential effects relative to No-Action conditions in accordance with NEPA requirements and potential impacts compared to existing conditions to meet CEQA requirements. With respect to vegetation, the environmental impact issues and concerns are the following:

1. Substantially Alter Riparian Habitat and Other Sensitive Communities during Construction.
2. Substantially Alter Riparian Habitat and Other Sensitive Communities during the Operations and Maintenance Phase of the Project.
3. Facilitate Increase in Distribution and Abundance of Invasive Plants in the Project area.
4. Conflict with Provisions of Local Plans in the Project area.

Other vegetation-related issues covered in the Program Environmental Impact Statement/Report (PEIS/R) are not covered here because they are programmatic in nature and/or are not relevant to the Project area.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the SJRRP would be implemented, including habitat restoration, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these activities would not achieve the Settlement goals. The potential effects of the No-Action Alternative are described below. The analysis is a comparison to existing conditions, and no mitigation is required for No-Action.

Impact VEG-1 (No-Action Alternative): *Substantially Alter Riparian Habitat and Other Sensitive Communities during Construction.* Under the No-Action Alternative, Project construction activities that could fragment, separate or remove native wetland, riparian, and other special-status vegetation alliances from their habitat or eliminate them would not be carried out. Compared to existing conditions, there would be **no impact**.

Impact VEG-2 (No-Action Alternative): *Substantially Alter Riparian Habitat and Other Sensitive Communities during the Operations and Maintenance Phase of the Project.* Under the No-Action Alternative, Restoration Flows in Reach 2B would increase the extent and duration of inundation, raise groundwater levels, and restore flows in areas that are inundated by flood flows only periodically (every 2 to 5 years). Restoration Flows may recruit new vegetation along the wetted channel banks; however, native riparian vegetation along the channel banks downstream of the San Mateo Avenue crossing would be maintained by the relatively stable water level held by Mendota Dam. River flows would not convert special-status vegetation alliances in the Project area to other vegetation types. For example, wetland habitats supported by Mendota Pool would not be altered. Riparian habitat would mature in areas upstream of San Mateo Avenue crossing, a **beneficial** effect.

Impact VEG-3 (No-Action Alternative): ***Facilitate Increase in Distribution and Abundance of Invasive Plants in the Project Area.*** Under the No-Action Alternative, current water and land management practices that facilitate the dispersal and establishment of invasive plant species would continue. In addition, other reasonably foreseeable projects could facilitate the dispersal and establishment of invasive plants in several ways: through transporting invasive plants' propagules into the Project area; creating bare ground for them to establish; by altering hydrology in a manner that is advantageous to invasive plant species; and eliminating competing native vegetation. Future projects would be subject to environmental review; however, only projects that have a Federal nexus are required to address impacts of invasive plant species (required under Federal Executive Order 11312), and CEQA-only projects would not necessarily be required to mitigate such impacts.

Under the No-Action Alternative, existing populations of invasive plant species would continue to be introduced and spread in the Project area. Invasive plant species would be dispersed to suitable sites by Restoration Flows, flood flows, natural and agricultural drainage, and other water releases from Friant Dam, Mendota Pool, and other facilities. Specifically, invasive plant species observed in the Project area ranked Cal-IPC high (see Section 6.1.2) have been identified as having the potential to adversely affect habitats and increase substantially as a result of continued water management operations in the Project area. However, as part of the Program, PEIS/R Conservation Measure INV-1 would implement an invasive plant monitoring and management plan to control, and where possible eradicate, invasive plant infestations (SJRRP 2011b, PEIS/R Table 2-7, page 2-75). As a result, there would be a **less than significant** impact from invasive plants.

Impact VEG-4 (No-Action Alternative): ***Conflict with Provisions of Local Plans in the Project Area.*** The No-Action Alternative would not reduce the effectiveness of the Madera and Fresno counties' general plan conservation strategies, and attainment of conservation plan goals and objectives would not otherwise be prevented. However, the No-Action Alternative would not result in beneficial effects on these plans because it would not actively support attainment of goals or objectives related to enhancing or restoring biological resources along Reach 2B. Compared to existing conditions without Interim or Restoration flows, there would be **no impact**.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would include construction of Project facilities including a Compact Bypass channel, a new levee system encompassing the river channel with a narrow floodplain, and the South Canal. Other key features include construction of the Mendota Pool Dike (separating the San Joaquin River and Mendota Pool), a fish barrier below Mendota Dam, and the South Canal bifurcation structure and fish passage facility, modification of the San Mateo Avenue crossing, and the removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

This alternative includes passive riparian habitat restoration and farming in the floodplain. It is assumed that over time wetland communities (obligate, facultative-wet, and facultative species) would develop within the main channel and that a dense riparian

scrubland would develop along the main river channel banks. The Restoration Flows would be used to recruit new vegetation along the channel from the existing seed bank. Between the main river channel banks and the proposed levees, agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) would occur. Invasive, non-native plant species would be removed from the channel and riparian areas during or following construction, and the Project would include long-term management for invasive plant species.

Impact VEG-1 (Alternative A): *Substantially Alter Riparian Habitat and Other Sensitive Communities during Construction.* Compared to No-Action, construction of Project features under Alternative A could have substantial effects on special-status vegetation alliances. Project actions related to these effects would include the following:

- The re-grading of the floodplain.
- The operation of equipment during construction, including, excavators, dump trucks, and graders.
- The breaching/removal of existing levees.
- Modifications to existing levees.

Re-grading the floodplain would occur primarily in existing agricultural areas but some areas of riparian habitat and other sensitive communities would be affected where floodplain grading connects to the river channel because some vegetation would be removed to complete the grading. The operation of equipment during construction would potentially affect riparian habitat and other sensitive communities through clearing, grubbing, pruning, and incidental damage, such as compression of root zones and accidental impact by machinery. Breaching and removal of existing levees, which is necessary to allow overbank flows to spread onto the floodplain, would remove existing riparian vegetation along the existing levees.

Construction of Alternative A could affect the acreages of special-status vegetation alliances shown in Table 6-5. These acreages represent the worst-case scenario where all existing floodplain areas are assumed to be impacted. “Infrastructure” generally refers to area permanently converted to structures, levees or roads. “Floodplain” primarily refers to the floodplain of the San Joaquin River and the acreage impacted under this category may be disturbed up to 3 years following construction, but eventually return to natural habitat or farming. “Borrow” refers to the maximum amount of habitat that could be disturbed to take fill materials for levees. Other impacts refer to construction staging areas, temporary access roads and other construction-related disturbances. Areas temporarily disturbed during construction will be restored to their previous contours, if feasible, and then seeded with a native vegetation seed mixture to prevent soil erosion. Some areas, such as borrow areas, may not be feasible to restore previous contours, but these areas would be smoothed and seeded (see Section 2.2.4).

However, Conservation Measures RHSNC-1 and RHSNC-2 would be implemented as part of the Project to offset adverse effects of Project construction on special-status vegetation alliances. These measures would avoid and minimize loss of riparian habitat

and other sensitive natural communities during construction of the Project, and promote re-establishment of this vegetation after construction (see Table 2-8 in Chapter 2.0, "Description of Alternatives"). Conservation Measure RHSNC-1 requires biological surveys to identify, map, and quantify riparian and other sensitive communities in the Project area. Construction in riparian habitat and other sensitive communities would be avoided, to the extent practicable. Conservation Measure RHSNC-2 requires implementing the Program's Riparian Habitat Mitigation and Monitoring Plan. If losses of sensitive vegetation communities are not offset by the Program, then compensation would be provided through creating, restoring, or preserving in-kind communities. Development and implementation of the Program mitigation and monitoring plans would support this process.

Conservation Measure PLANTS-1 would also be implemented, as appropriate, to identify, avoid, and minimize temporary or permanent loss of special-status plant species found in the Project area, if any. (No special-status plant species were identified in the Project area during field surveys in 2010 and 2011). In addition, Conservation Measure INV-1 includes monitoring and controlling the spread of invasive plant species that could interfere with successful establishment and survival of native riparian plant species. This measure would enhance riparian and emergent wetland communities by controlling invasive plant species, such as red sesbania and giant reed, which can displace native riparian and wetland species (discussed below under Impact VEG-3).

Table 6-5.
Special-Status Vegetation Alliances Potentially Affected by Alternative A

Common Name	Scientific Name	Maximum Impacted Area (Acres)			
		Infra-structure	Flood-plain	Borrow	Other
		(not future habitat)	(future habitat or agriculture)		
Riparian Forest and Woodland Alliances					
Fremont cottonwood forest	*Populus fremontii* alliance	7.4	37.7	1.0	14.2
Oregon ash groves	*Fraxinus latifolia* forest alliance	0.2	6.7	-	-
Valley oak woodland	*Quercus lobata woodland* alliance	-	-	-	-
Riparian Thicket Alliances					
Black willow thickets	*Salix gooddingii* alliance	14.3	97.3	1.8	7.3
Buttonwillow thickets	*Cephalanthus occidentalis* alliance	0.1	0.9	-	-
Red willow thickets	*Salix laevigata* woodland alliance	-	0.6	-	-
Arrow weed thickets	*Pluchea sericea* shrubland alliance	0.1	0.4	-	-
Riparian Scrub Alliances					
Blue elderberry stands	*Sambucus nigra* shrubland alliance	13.8	61.6	-	-
California rose briar patches	*Rosa californica* alliance	0.7	10.1	0.7	0.3
Spinescale scrub	*Atriplex spinifera* alliance	-	0.0	-	-
Silver bush lupine scrub	*Lupinus albifrons* shrubland alliance	0.7	1.3	-	-

Table 6-5.
Special-Status Vegetation Alliances Potentially Affected by Alternative A

Common Name	Scientific Name	Maximum Impacted Area (Acres)			
		Infra-structure	Flood-plain	Borrow	Other
		(not future habitat)	(future habitat or agriculture)		
Grassland and Herbaceous Field Alliances					
Tar plant fields	*Centromadia pungens* or other species herbaceous alliance	0.5	33.0	-	-
Creeping rye grass turfs	*Leymus triticoides* herbaceous alliance	0.1	6.1	-	-
Salt grass flats	*Distichlis spicata* herbaceous alliance	-	1.4	-	-
Marsh and Wet Meadow Alliances					
California bulrush marsh	*Schoenoplectus californicus* herbaceous alliance	4.1	12.0	0.8	0.7
Pale spike rush marsh	*Eleocharis macrostachya* herbaceous alliance	1.6	-	-	-
Yerba mansa meadows	*Anemopsis californica* herbaceous alliance	-	0.8	-	-
Alkali heath marsh	*Frankenia salina* alliance	-	0.2	-	-
Total		***43.5***	***270.2***	***4.3***	***22.6***

Key:
Infrastructure = structures, levees, or roads
Floodplain = floodplain of the San Joaquin River (passive restoration and agricultural activities)
Borrow = maximum amount disturbed to take fill materials for levees (reseeded)
Other = construction staging areas, temporary access roads, and other construction-related disturbances (reseeded)

Avoidance, minimization, and compensation for loss of riparian habitat, other sensitive natural communities (i.e., special-status vegetation alliances), and special-status plant species would reduce the potential for adverse effects to vegetation during construction. Because these conservation measures would be implemented as part of the Project, Alternative A would not have substantial effects on existing special-status vegetation alliances.

When comparing Alternative A to existing conditions, impacts to riparian habitat and other sensitive natural communities would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). Compared to existing conditions, impacts of Alternative A would be **less than significant** for the reasons stated above.

Impact VEG-2 (Alternative A): ***Substantially Alter Riparian Habitat and Other Sensitive Communities during the Operations and Maintenance Phase of the Project.*** Compared to the No-Action Alternative, Alternative A would result in expanding the river's floodplain and increasing the flow conveyance capacity of Reach 2B. These changes, in combination with Restoration Flows, would cause hydrologic modifications that would change the inundation regime (duration, depth, timing, or extent), scour or deposition (due to changes in streamflow velocity), or soil moisture (due to changes in

groundwater level) available for plant growth. These changes would facilitate establishment of riparian habitat and other sensitive natural communities (special-status vegetation alliances) in some areas of the floodplain, but convert some existing vegetation to other vegetation types.

In some locations within the Project area, Restoration Flows would submerge the roots, shoots and leaves of existing riparian and wetland plants for weeks or months during each growing season. The growth of mature submerged plants would be reduced, and some plant parts would be damaged (Coops et al. 1996). Sapling trees, immature shrubs and poorly established herbaceous perennials would be killed. Successive years of prolonged submergence would result in mortality of the majority of trees, shrubs, and perennial forbs and grasses that are dominant in the riparian areas subject to flooding. However, many mature riparian and wetland plants that would be submerged are resistant to flooding damage and would survive inundation lasting up to several weeks (Karrenberg et al. 2002). Mortality would be expected in riparian and wetland vegetation subjected to complete and continual submergence for several weeks every year.

The scour and deposition of sediment can damage riparian and wetland vegetation by abrasion or burial (Friedman and Auble 1999). Along Reach 2B, scour and sediment deposition may occur, as described in Chapter 14, “Surface Water Resources and Water Quality.” However, most riparian vegetation along this reach is Fremont cottonwood, black willow, and sandbar willow scrub and the dominant species of these communities (e.g., the willows) are particularly resistant to damage by scour or burial. The dominant species of emergent wetlands (e.g., cattail and tule species) also are resistant to such damage (Grace and Harrison 1986). Furthermore, scour and deposition of sediment sustains floodplain habitats and creates opportunities for plant establishment, thus sustaining the diversity of riparian and wetland vegetation. Scour and deposition of sediment would ultimately enhance floodplain habitat and increase establishment opportunities. As a result, a substantial adverse effect on riparian or wetland vegetation is not expected.

In the long term, the Project is expected to result in a net increase in riparian and emergent wetland vegetation throughout the Project area. Passive riparian habitat restoration of the San Joaquin River would improve native floodplain and in-channel habitats, which would likely benefit native species. Benefits to native species would be realized through the re-introduction of perennial base flows as well as seasonal high flows in the river, which in turn would promote the establishment of native riparian vegetation. Well-established native plant communities in the floodplain would support rich and diverse native flora, potentially including special status plant species, and could effectively prevent invasive vegetation encroachment. Alternative A would restore river-floodplain connectivity and longitudinal connectivity of riparian vegetation near the channel (without major breaks in the distribution of woody vegetation except where natural conditions prevent establishment of native trees or shrubs), enhance landscape connectivity between the river corridor and adjacent areas of ecological significance (e.g., adjacent sloughs or tributary channels with existing riparian habitat), and protect, restore, or enhance special status vegetation communities and other plant species.

Reclamation conducted a study of vegetation response to flow regimes and mechanical actions of Project alternatives using a one-dimensional flow, sediment transport, vegetation growth model called Sedimentation and River Hydraulics One Dimensional Vegetation Model (SRH-1DV). Although there are some differences in the predicted changes in vegetation by reach between the SRH-1DV vegetation modeling results and the more qualitative potential future vegetation evaluation, both predict an overall expansion of riparian vegetation in Reach 2B in response to Restoration Flows. Similarly, pilot flow studies conducted in 2000 and 2001 suggest that restoring perennial and seasonally variable flows would increase riparian plant establishment and encourage greater plant species diversity (McBain and Trush 2002).

During certain times of year in Reach 2B, Restoration Flows would increase groundwater elevations in the root zones of riparian and wetland plants and possibly submerge some, but not all, of their aboveground parts. Where this hydration or partial submergence occurs during late spring to fall, plant growth would increase because the growth of riparian and wetland plants is sensitive to water availability at these times of year (Grace and Harrison 1986, U.S. Army Corps of Engineers [Corps] 2000).

Inundation would also create conditions suitable for dispersal and establishment of riparian or wetland plants. These conditions could be created by scour and sediment deposition, water transport of plant seeds and fragments to new locations, increased water availability, and reduced competition from upland plant species (such as some nonnative grasses) that are intolerant of prolonged submergence.

When comparing Alternative A to existing conditions, impacts to riparian habitat and other sensitive natural communities would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). According to habitat restoration estimates, Alternative A could support up to 1,420 acres of sensitive natural vegetation communities (SJRRP 2012, Attachment A). This represents more than a 3-fold increase in sensitive natural communities as compared to existing conditions. Therefore, compared to existing conditions, the Alternative A is expected to result in a **beneficial** effect.

Impact VEG-3 (Alternative A): *Facilitate Increase in Distribution and Abundance of Invasive Plants in the Project Area.* Compared to No-Action, the increased conveyance capacity, increased floodplain area, and the floodplain and channel grading of Alternative A, in combination with flood flows and Restoration Flows, could enhance dispersal of invasive plant species, and substantially increase opportunities for establishment, growth, and reproduction of invasive plant species. Invasive plants are capable of substantially affecting riparian and wetland vegetation.

Under Alternative A, invasive, non-native plant species would be removed from the Project area during the construction phase. Removal techniques may include mechanical removal, root excavation, hand pulling, mowing, disking, controlled burning, grazing, aquatic-safe herbicides, or a combination of techniques as appropriate (see Section 2.2.5). This could cause a short-term reduction in invasive plant species in the Project area.

However, invasive plant species would likely recolonize the Project area after these activities are complete.

The conveyance capacity of Reach 2B would increase under Alternative A. Flood flows and Restoration Flows could substantially increase the quantity of water flowing through Reach 2B during wet years. These hydrologic alterations could facilitate the spread of invasive plant species (e.g., red sesbania, salt cedar, giant reed-grass, and sponge plant) to new floodplain areas in Reach 2B and to downstream reaches. Flows could disperse propagules of these invasive plant species, particularly giant reed and red sesbania. Giant reed-grass, currently present at Mendota Pool and other reaches upstream, is dispersed by high flows (and machinery) that fragment plants and carry fragments downstream to new sites, where they take root and begin forming a new colony (Bossard et al. 2000). Red sesbania is currently abundant and widespread throughout Reaches 1 and 2A, but has not been observed in Reach 2B. Red sesbania produces seed pods that float for several days (Hunter and Platenkamp 2003). Sponge plant is an aquatic species distributed by water; it is present in Reach 1 but currently has a very restricted distribution in California. Therefore, these species could be dispersed to additional locations.

Floodplain and channel grading would increase the inundation area of the floodplain. In the San Joaquin Valley, invasive plant species are largely confined to sites with moderate or high levels of water availability. Therefore, by increasing water availability throughout the growing season, particularly in locations that would otherwise lack surface water (e.g., floodplain benches), Restoration Flows could aid their establishment in Reach 2B. Established plants are less sensitive than seedlings to water availability and have deeper and more extensive root systems; therefore, these plants, once established, would likely persist at additional sites. In particular, Restoration Flows may aid the establishment of red sesbania at additional locations. Because red sesbania is abundant in Reach 1 and produces floating seed that can remain dormant for at least several years, the increased availability of water during the growing season would likely allow the establishment of numerous individuals in floodplain locations where they otherwise would not have been able to germinate, grow, and survive. Furthermore, invasive plant species are more likely to become established in newly graded areas and areas subject to scour than in areas with existing cover.

Long-term management of the Project would include removal of invasive non-native plant species currently found within the reach and removal of other invasive species that are currently found in upstream reaches which eventually colonize the Project area (see Section 2.2.5). The Project would also implement Conservation Measure INV-1. Conservation Measure INV-1 requires the lead agencies to implement the Program's Invasive Vegetation Monitoring and Management Plan to control the spread and introduction of invasive plants including measures to monitor, control, and eradicate, where possible, invasive plant infestations. The Invasive Vegetation Monitoring and Management Plan includes monitoring procedures, success criteria, and adaptive management measures for controlling invasive plant species (see Section 2.2.10).

When comparing Alternative A to existing conditions, impacts would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). For these reasons, this impact would be **less than significant**.

Impact VEG-4 (Alternative A): ***Conflict with Provisions of Local Plans in the Project Area.*** Compared to the No-Action Alternative, Alternative A would not conflict with the provisions of the Fresno and Madera counties' general plans. The Project would not substantially reduce the viability of target species, reduce habitat value or interfere with the management of conserved lands, or eliminate opportunities for conservation actions. The Project is expected to result in a long-term increase in wetland and riparian habitats and other sensitive natural communities that support special-status vegetation alliances. These consequences of implementing the Project would benefit general plans that strive to conserve, restore, and enhance these habitats and maintain the species they support. The Project would enhance opportunities to implement conservation strategies and attain conservation goals by providing hydrologic conditions necessary to restore riparian and aquatic habitats and other sensitive natural communities.

When comparing Alternative A to existing conditions, impacts would be similar to those discussed in the preceding paragraph (i.e., the comparison of Alternative A to No-Action). This would result in supporting the two general plan policies, a **beneficial** effect.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B would include construction of Project features including a Compact Bypass channel, a new levee system with a wide, consensus-based floodplain encompassing the river channel, and the Compact Bypass Bifurcation Structure with fish passage facility. Other key features include construction of a fish passage facility at the San Joaquin River control structure at the Chowchilla Bifurcation Structure, the re-route of Drive 10 ½ (across the Compact Bypass control structure), and removal of the San Mateo Avenue crossing. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Alternative B includes a mixture of active and passive riparian and floodplain habitat restoration and compatible agricultural activities in the floodplain. Active restoration planting would occur along the low flow channel of the river and in riparian establishment areas to establish a riparian area and seed bank, and floodplain areas would be seeded with native plants. Active revegetation activities would likely include a combination of seeding, transplanting, and pole/live stake plantings. Plantings would generally be designed as clusters of trees and shrubs with larger areas of seeded grasses and forbs. Spacing and alignment of plantings would take into account species growth patterns, potential equipment access needs for monitoring and maintenance, and desired future stand development. Passive restoration would occur in areas that rely on Restoration Flows for additional vegetation recruitment. Natural riparian recruitment (passive restoration) would promote continual habitat succession, particularly in areas where sediment is deposited or vegetation is removed by natural processes. Plantings that are wetland species or borderline wetland species would be irrigated and managed as necessary during the establishment period of 3 to 5 years. Invasive, non-native plant

species would be removed from the Project area during or following construction, and the Project would include long-term management for invasive plant species.

Impact VEG-1 (Alternative B): ***Substantially Alter Riparian Habitat and Other Sensitive Communities during Construction.*** Impacts and effects during Project construction would be similar to those analyzed under Impact VEG-1 (Alternative A), with the following exceptions. Construction of the Project under Alternative B would affect the acreages of special-status vegetation alliances shown in Table 6-6. In general, there would be fewer impacts to special-status vegetation alliances from Project infrastructure and staging areas, but more potential impacts from borrow, under Alternative B than compared to Alternative A. The amount of special-status vegetation alliances located in the Project floodplain would be higher, but much of the area impacted in the floodplain created by Alternative B would be restored through active and passive riparian and floodplain habitat restoration.

Table 6-6.
Special-Status Vegetation Alliances Potentially Affected by Alternative B

Common Name	Scientific Name	Maximum Impacted Area (Acres)			
		Infra-structure	Flood-plain	Borrow	Other
		(not future habitat)	(future habitat or agriculture)		
Riparian Forest and Woodland Alliances					
Fremont cottonwood forest	*Populus fremontii* alliance	9.7	47.5	1.4	0.3
Oregon ash groves	*Fraxinus latifolia* forest alliance	0.3	6.6	-	0.1
Valley oak woodland	*Quercus lobata woodland* alliance	-	-	-	-
Riparian Thicket Alliances					
Black willow thickets	*Salix gooddingii* alliance	13.2	104.6	2.7	1.8
Buttonwillow thickets	*Cephalanthus occidentalis* alliance	0.1	0.9	<0.01	0.2
Red willow thickets	*Salix laevigata* woodland alliance	-	0.6	-	-
Arrow weed thickets	*Pluchea sericea* shrubland alliance	-	0.4	-	-
Riparian Scrub Alliances					
Blue elderberry stands	*Sambucus nigra* shrubland alliance	6.1	66.4	-	-
California rose briar patches	*Rosa californica* alliance	0.4	10.4	0.7	0.4
Spinescale scrub	*Atriplex spinifera* alliance	-	<0.04	<0.01	-
Silver bush lupine scrub	*Lupinus albifrons* shrubland alliance	0.4	2.0	-	1.7
Grassland and Herbaceous Field Alliances					
Tar plant fields	*Centromadia pungens* or other species herbaceous alliance	0.4	33.0	-	1.4
Creeping rye grass turfs	*Leymus triticoides* herbaceous alliance	-	6.1	-	-
Salt grass flats	*Distichlis spicata* herbaceous alliance	-	1.4	0.6	-

Table 6-6.
Special-Status Vegetation Alliances Potentially Affected by Alternative B

Common Name	Scientific Name	Maximum Impacted Area (Acres)			
		Infra-structure	Flood-plain	Borrow	Other
		(not future habitat)	(future habitat or agriculture)		
Marsh and Wet Meadow Alliances					
California bulrush marsh	*Schoenoplectus californicus* herbaceous alliance	0.2	18.7	3.0	0.7
Pale spike rush marsh	*Eleocharis macrostachya* herbaceous alliance	-	-	-	-
Yerba mansa meadows	*Anemopsis californica* herbaceous alliance	-	0.8	-	-
Alkali heath marsh	*Frankenia salina* alliance	-	0.2	<0.05	-
Total		***30.6***	***299.6***	***8.4***	***6.6***

Key:
Infrastructure = structures, levees, or roads
Floodplain = floodplain of the San Joaquin River (mixture of active and passive restoration and agricultural activities)
Borrow = maximum amount disturbed to take fill materials for levees (reseeded)
Other = construction staging areas, temporary access roads, and other construction-related disturbances (reseeded)

The existing native vegetation in the Project area designated to remain would be temporarily fenced with orange snow fencing (or equivalent) to prevent entry, driving, parking, or storing equipment or material within these areas during construction. This existing vegetation would be left in place or only minimally trimmed to facilitate access and work at the site. In order to maximize plant growth and planting success, existing soil and topsoil would be preserved unless the soil contains invasive non-native seed or fragmented stems and rhizomes, in which case it should not be preserved, and disturbance during construction would be minimized to the maximum practicable extent.

As described under Impact VEG-1 (Alternative A), avoidance, minimization, and compensation for loss of riparian habitat, other sensitive natural communities (i.e., special-status vegetation alliances), and special-status plant species would reduce the potential for adverse effects to vegetation during construction. Impacts of Alternative B would be **less than significant**.

Impact VEG-2 (Alternative B): *Substantially Alter Riparian Habitat and Other Sensitive Communities during the Operations and Maintenance Phase of the Project.* Project effects would be similar to those analyzed under Impact VEG-2 (Alternative A), with the following exceptions. Alternative B includes a mixture of active and passive riparian and floodplain habitat restoration and compatible agricultural activities in the floodplain in a wide, consensus-based floodplain.

Table 6-7 lists the species that are likely to be planted or seeded during active restoration. Emergent wetlands and water tolerant woody species of riparian scrub would be selected for development within the main channel, woody shrubs and trees with an herbaceous understory would be selected for development along the main river channel banks, and

bands of other habitat types (e.g., grasses) would be selected for development at higher elevations along the channel corridor. Active vegetation restoration would occur following construction and these areas would be irrigated and managed as necessary during the establishment period. Phased implementation of active vegetation restoration at strategic locations could occur concurrently with phased implementation of construction and physical infrastructure.

Table 6-7.
Potential Species for Revegetation

Common Name	Scientific Name	Vegetation Type
Riparian Shrub and Wetland Areas (0 to 2 feet above summer baseflow elevations)		
Gooding's willow	*Salix gooddingii*	tree
common buttonbrush	*Cephalanthus occidentalis*	shrub
narrowleaf willow	*Salix exigua*	shrub
redroot flatsedge	*Cyperus erythrorhizos*	annual sedge
baltic rush	*Juncus balticus*	perennial rush
dwarf barley	*Hordeum depressum*	annual grass
spike bentgrass	*Agrostis exarata*	perennial grass
meadow barley	*Hordeum brachyantherum*	perennial grass
distant phacelia	*Phacelia distans*	annual forb
seep monkeyflower	*Mimulus guttatus*	annual/perennial forb
yerba mansa	*Anemopsis californica*	perennial forb
Douglas' sagewort	*Artemisia douglasiana*	perennial forb
Dense Riparian Areas (2 to 8 feet above summer baseflow elevations)		
white alder	*Alnus rhombifolia*	tree
Oregon ash	*Fraxinus latifolia*	tree
California sycamore	*Platanus racemosa*	tree
Fremont cottonwood	*Populus fremontii*	tree
Gooding's willow	*Salix gooddingii*	tree
mule-fat	*Baccharis salicifolia*	shrub
California wildrose	*Rosa californica*	shrub
narrowleaf willow	*Salix exigua*	shrub
dwarf barley	*Hordeum depressum*	annual grass
spike bentgrass	*Agrostis exarata*	perennial grass
meadow barley	*Hordeum brachyantherum*	perennial grass
Douglas' sagewort	*Artemisia douglasiana*	perennial forb
Upland Areas (greater than 8 feet above summer baseflow elevations)		
cattle saltbush	*Atriplex polycarpa*	shrub
California wildrose	*Rosa californica*	shrub
Saltgrass	*Distichlis spicata*	perennial grass
blue wildrye	*Elymus glaucus*	perennial grass
beardless wildrye	*Leymus triticodes*	perennial grass
California goldfields	*Lasthenia californica*	annual forb
bull clover	*Trifolium fucatum*	annual forb

Plantings that are wetland species or borderline wetland species would need regular aboveground irrigation (typically April through October) during their establishment period (typically 3 to 5 years depending on rainfall conditions and the plants' growth rates and vigor). An extensive temporary aboveground irrigation system, such as aerial spray or drip irrigation, would provide water for the plants several times a week during the hot months of the year.

Maintenance and monitoring would be conducted following revegetation. Monitoring activities include monitoring of the installed plants for drought stress and overwatering, identification of competitive, invasive, non-native species for removal, identification of diseased, dead and washed-out plants, irrigation system function, and identification of trash and debris for removal. Maintenance activities would include controlling invasive plant species, mitigating animal damage, irrigation, replacement of diseased, dead, or washed-out plants, irrigation system maintenance, and removal of trash and debris.

Agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) could occur on the floodplain in previous agricultural areas outside of State-owned and public trust lands. Growers would be required to leave cover on the ground and would be required to develop and implement a Water Quality Plan, approved by the Reclamation, to meet then-existing water quality standards for coldwater fisheries beneficial in downstream areas.

When comparing Alternative B to existing conditions, impacts to riparian habitat and other sensitive natural communities would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative B to No-Action). According to habitat restoration estimates, Alternative B could support up to 1,970 acres of sensitive natural vegetation communities (SJRRP 2012, Attachment A). This represents more than a 5-fold increase in sensitive natural communities as compared to existing conditions. This would be a **beneficial** effect.

Impact VEG-3 (Alternative B): ***Facilitate Increase in Distribution and Abundance of Invasive Plants in the Project Area.*** Refer to Impact VEG-3 (Alternative A). Potential impacts for Alternative B would be similar to potential impacts of Alternative A with the exception that Alternative B includes a mixture of active and passive riparian and floodplain habitat restoration which may delay the establishment of invasive plant species. This impact would be **less than significant**.

Impact VEG-4 (Alternative B): ***Conflict with Provisions of Local Plans in the Project Area.*** Refer to Impact VEG-4 (Alternative A). Potential impacts for Alternative B would be the same as potential impacts of Alternative A, and would result in a **beneficial** effect compared to existing conditions.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C would include construction of Project features including Fresno Slough Dam, a new levee system with a narrow floodplain encompassing the river channel, and the Short Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the Short Canal control structure and fish

screen, the Chowchilla Bifurcation Structure fish passage facility, modification of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Similar to Alternative B, Alternative C includes active riparian and floodplain habitat restoration. It is assumed that wetland communities would develop within the main channel, that a dense riparian scrubland would develop along the main river channel banks, and that bands of other habitat types (wetland, scrub, grassland, and forest) would develop at higher elevations along the floodplain corridor. The wetland, floodplain, and riparian areas would be planted following construction and then irrigated and managed as necessary during the establishment period.

Impact VEG-1 (Alternative C): *Substantially Alter Riparian Habitat and Other Sensitive Communities during Construction.* Refer to Impact VEG-1 (Alternative A). Potential impacts during Project construction for Alternative C would be similar to potential impacts of Alternative A, with the following exception. Construction of the Project would affect the acreages of special-status vegetation alliances shown in Table 6-8. As described under Impact VEG-1 (Alternative A), avoidance, minimization, and compensation for loss of riparian habitat, other sensitive natural communities (i.e., special-status vegetation alliances), and special-status plant species would reduce the potential for adverse effects to vegetation during construction. Impacts of Alternative C would be **less than significant**.

Table 6-8.
Special-Status Vegetation Alliances Potentially Affected by Alternative C

Common Name	Scientific Name	Maximum Impacted Area (Acres)			
		Infra-structure	Flood-plain	Borrow	Other
		(not future habitat)	(future habitat)	(future habitat or agriculture)	
Riparian Forest and Woodland Alliances					
Fremont cottonwood forest	*Populus fremontii* alliance	7.4	52.3	10.5	5.7
Oregon ash groves	*Fraxinus latifolia* forest alliance	0.2	6.7	-	0.1
Valley oak woodland	*Quercus lobata woodland* alliance	-	-	-	-
Riparian Thicket Alliances					
Black willow thickets	*Salix gooddingii* alliance	11.5	107.1	1.8	17.0
Buttonwillow thickets	*Cephalanthus occidentalis* alliance	0.4	0.9	-	0.2
Red willow thickets	*Salix laevigata* woodland alliance	-	0.6	-	-
Arrow weed thickets	*Pluchea sericea* shrubland alliance	-	0.4	-	-
Riparian Scrub Alliances					
Blue elderberry stands	*Sambucus nigra* shrubland alliance	9.0	66.4	-	-
California rose briar patches	*Rosa californica* alliance	1.8	10.6	0.5	0.5
Spinescale scrub	*Atriplex spinifera* alliance	0.4	0.0	-	0.2

Table 6-8.
Special-Status Vegetation Alliances Potentially Affected by Alternative C

Common Name	Scientific Name	Maximum Impacted Area (Acres)			
		Infra-structure	Flood-plain	Borrow	Other
		(not future habitat)	(future habitat)	(future habitat or agriculture)	
Silver bush lupine scrub	*Lupinus albifrons* shrubland alliance	0.4	2.0	-	1.7
Grassland and Herbaceous Field Alliances					
Tar plant fields	*Centromadia pungens* or other species herbaceous alliance	0.9	33.0	-	1.4
Creeping rye grass turfs	*Leymus triticoides* herbaceous alliance	-	6.1	-	-
Salt grass flats	*Distichlis spicata* herbaceous alliance	0.3	1.4	-	0.1
Marsh and Wet Meadow Alliances					
California bulrush marsh	*Schoenoplectus californicus* herbaceous alliance	4.1	15.8	4.9	24.8
Pale spike rush marsh	*Eleocharis macrostachya* herbaceous alliance	-	0.8	-	0.8
Yerba mansa meadows	*Anemopsis californica* herbaceous alliance	0.4	0.2	0.1	0.7
Alkali heath marsh	*Frankenia salina* alliance	0.2	-	-	0.2
Total		***37.2***	***304.5***	***12.7***	***32.0***

Key:
Infrastructure = structures, levees, or roads
Floodplain = floodplain of the San Joaquin River (active restoration)
Borrow = maximum amount disturbed to take fill materials for levees (reseeded)
Other = construction staging areas, temporary access roads, and other construction-related disturbances (reseeded)

Impact VEG-2 (Alternative C): ***Substantially Alter Riparian Habitat and Other Sensitive Communities during the Operations and Maintenance Phase of the Project.*** Alternative C includes active riparian and floodplain habitat restoration. The wetland, floodplain, and riparian areas would be planted following construction and then irrigated and managed as necessary during the establishment period.

Several native vegetation alliances could be incorporated into the floodplain and habitat planting design. The grass-dominated vegetation alliances could be substantially larger than those that would develop under the No-Action Alternative. All of the elevated areas of the meander loops could be maintained or restored to saltgrass flats. The adjacent existing wetland areas within the loops could be preserved or enhanced by additional wetland species plantings and removal of numerous invasive plant species. The lower lying portions of the reach could be planted with the buttonwillow thicket vegetation alliance. Because of the wide floodplain and the slowly moving water, the extent of this vegetation alliance could be substantially larger than that which would develop under No-Action. The extent of black willow thicket and California mugwort brush could also increase over what might develop under the No-Action Alternative.

Additional restoration work could focus on the re-establishment of the riparian bank herbs, California bulrush marsh, Oregon ash groves, creeping rye grasslands, and Fremont cottonwood forests. Because of the fast growth and its soft and brittle wood, the cottonwood is considered to be a good source of large woody debris and organic matter within the riverine channel. The riverside levee banks would be planted with native grass species such as those in the creeping rye grassland alliance. Since creeping wild rye (*Leymus triticoides*) is a facultative wetland species that thrives in the upper parts of riparian areas, the extent of creeping rye grassland could be substantially larger than that which would develop under No-Action, a beneficial effect.

When comparing Alternative C to existing conditions, impacts to riparian habitat and other sensitive natural communities would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative C to No-Action). According to habitat restoration estimates, Alternative C could support up to 1,450 acres of sensitive natural vegetation communities including buttonwillow thickets, California bulrush marsh, California mugwort brush, creeping rye grass turfs, riparian banks forbes and herbs, salt grass flats, Fremont cottonwood forest, Oregon ash groves, sandbar willow thickets, and black willow thickets (SJRRP 2012, Attachment A). This represents more than a 3-fold increase in sensitive natural communities as compared to existing conditions. This would be a **beneficial** effect.

Impact VEG-3 (Alternative C): *Facilitate Increase in Distribution and Abundance of Invasive Plants in the Project Area.* Refer to Impact VEG-3 (Alternative A). Potential impacts for Alternative C would be similar to potential impacts of Alternative A with the exception that Alternative C includes active riparian and floodplain habitat restoration which may delay the establishment of invasive plant species. This impact would be **less than significant**.

Impact VEG-4 (Alternative C): *Conflict with Provisions of Local Plans in the Project Area.* Refer to Impact VEG-4 (Alternative A). Potential impacts for Alternative C would be the same as potential impacts of Alternative A. This would be a **beneficial** effect compared to existing conditions.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D would include construction of Project features including Fresno Slough Dam, a new levee system with a wide floodplain encompassing the river channel, and the North Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the North Canal bifurcation structure and North Canal fish passage facility, removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure, removal of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Similar to Alternative A, Alternative D includes passive riparian habitat restoration and farming in the floodplain. It is assumed that over time wetland communities would develop within the main channel and that a dense riparian scrubland would develop along the main river channel banks. The Restoration Flows would be used to recruit new

vegetation along the channel from the existing seed bank. Between the main river channel banks and the proposed levees, agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) would occur.

Impact VEG-1 (Alternative D): ***Substantially Alter Riparian Habitat and Other Sensitive Communities during Construction.*** Refer to Impact VEG-1 (Alternative A). Potential impacts for Alternative D during Project construction would be similar to potential impacts of Alternative A with the following exception. Construction of the Project would affect the acreages of special-status vegetation alliances shown in Table 6-9. As described under Impact VEG-1 (Alternative A), avoidance, minimization, and compensation for loss of riparian habitat, other sensitive natural communities (i.e., special-status vegetation alliances), and special-status plant species would reduce the potential for adverse effects to vegetation during construction. Impacts of Alternative D would be **less than significant**.

Impact VEG-2 (Alternative D): ***Substantially Alter Riparian Habitat and Other Sensitive Communities during the Operations and Maintenance Phase of the Project.*** Refer to Impact VEG-2 (Alternative A). Similar to Alternative A, Alternative D includes passive riparian habitat restoration and farming in the floodplain. The Restoration Flows would be used to recruit new vegetation along the channel from the existing seed bank. Between the main river channel banks and the proposed levees, agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) would occur. According to habitat restoration estimates, Alternative D could support up to 2,000 acres of sensitive natural vegetation communities including buttonwillow thickets, California bulrush marsh, California mugwort brush, creeping rye grass turfs, riparian banks forbes and herbs, salt grass flats, Fremont cottonwood forest, Oregon ash groves, sandbar willow thickets, and black willow thickets (SJRRP 2012, Attachment A). This represents more than a 5-fold increase in sensitive natural communities as compared to existing conditions. This would be a **beneficial** effect.

Table 6-9.
Special-Status Vegetation Alliances Potentially Affected by Alternative D

Common Name	Scientific Name	Maximum Impacted Area (Acres)			
		Infra-structure	Flood-plain	Borrow	Other
		(not future habitat)	(future habitat or agriculture)		
Riparian Forest and Woodland Alliances					
Fremont cottonwood forest	*Populus fremontii* alliance	10.4	57.0	3.0	5.6
Oregon ash groves	*Fraxinus latifolia* forest alliance	1.0	5.9	-	-
Valley oak woodland	*Quercus lobata woodland* alliance	-	-	-	0.2
Riparian Thicket Alliances					
Black willow thickets	*Salix gooddingii* alliance	17.1	100.5	1.8	17.8
Buttonwillow thickets	*Cephalanthus occidentalis* alliance	0.4	0.9	-	0.2

Table 6-9.
Special-Status Vegetation Alliances Potentially Affected by Alternative D

Common Name	Scientific Name	Maximum Impacted Area (Acres)			
		Infra-structure	Flood-plain	Borrow	Other
		(not future habitat)	(future habitat or agriculture)		
Red willow thickets	*Salix laevigata* woodland alliance	-	0.6	-	-
Arrow weed thickets	*Pluchea sericea* shrubland alliance	-	0.4	-	-
Riparian Scrub Alliances					
Blue elderberry stands	*Sambucus nigra* shrubland alliance	9.8	65.6	-	-
California rose briar patches	*Rosa californica* alliance	3.1	8.9	0.7	0.3
Spinescale scrub	*Atriplex spinifera* alliance	0.4	-	-	0.2
Silver bush lupine scrub	*Lupinus albifrons* shrubland alliance	0.1	1.9	-	-
Grassland and Herbaceous Field Alliances					
Tar plant fields	*Centromadia pungens* or other species herbaceous alliance	0.8	33.0	-	0.1
Creeping rye grass turfs	*Leymus triticoides* herbaceous alliance	-	6.1	-	-
Salt grass flats	*Distichlis spicata* herbaceous alliance	0.3	1.4	-	0.1
Marsh and Wet Meadow Alliances					
California bulrush marsh	*Schoenoplectus californicus* herbaceous alliance	3.2	15.8	-	5.2
Pale spike rush marsh	*Eleocharis macrostachya* herbaceous alliance	-	-	-	-
Yerba mansa meadows	*Anemopsis californica* herbaceous alliance	-	0.8	-	-
Alkali heath marsh	*Frankenia salina* alliance	0.0	0.2	-	0.4
Total		***46.7***	***298.9***	***5.5***	***30.3***

Key:
Infrastructure = structures, levees, or roads
Floodplain = floodplain of the San Joaquin River (passive restoration and agricultural activities)
Borrow = maximum amount disturbed to take fill materials for levees (reseeded)
Other = construction staging areas, temporary access roads, and other construction-related disturbances (reseeded)

Impact VEG-3 (Alternative D): ***Facilitate Increase in Distribution and Abundance of Invasive Plants in the Project Area.*** Refer to Impact VEG-3 (Alternative A). Potential impacts for Alternative D would be the same as potential impacts of Alternative A. This impact would be **less than significant**.

Impact VEG-4 (Alternative D): ***Conflict with Provisions of Local Plans in the Project Area.*** Refer to Impact VEG-4 (Alternative A). Potential impacts for Alternative D would be the same as potential impacts of Alternative A. This would be a **beneficial** effect compared to existing conditions.

7.0 Biological Resources - Wildlife

This chapter describes the environmental and regulatory setting for wildlife resources, as well as the environmental consequences associated with construction and operation of Project alternatives, including impacts and mitigation measures.

7.1 Environmental Setting

This section describes the wildlife resources evaluated in this Environmental Impact Statement/Report (EIS/R), including wildlife habitat types and special-status wildlife species. Fish species are discussed separately in Chapter 5.0, "Biological Resources – Fisheries."

7.1.1 Regional Setting

The Project area lies within the San Joaquin Valley, which comprises the southern portion of California's Central Valley. The San Joaquin Valley is bounded by the Sierra Nevada mountain range to the east, the Tehachapi Mountains to south, and the Coast Range to the west. With the exception of the Tulare Lake basin, the watersheds of the San Joaquin Valley drain into the San Joaquin River, which leads to the Sacramento-San Joaquin Delta and ultimately into the San Francisco Bay.

The San Joaquin River originates high in the Sierra Nevada. It rapidly descends and exits mountainous terrain in the area now occupied by Friant Dam. The river discharges to the valley floor near Gravelly Ford. Prior to agricultural development, the San Joaquin River and its main tributaries meandered across alluvial fans along the main axis of the San Joaquin Valley floor. The river distributed higher flows into a complex network of sloughs that branched off both sides of the river. It flowed through a flat, homogeneous topography and supported a limited riparian forest. The flat valley floor surrounding the riparian forest often took the form of extensive wetlands, dominated by tule marsh. Riparian forest zones were present along the margins of the primary river channel and were not very extensive (The Bay Institute 1998).

Near Mendota, the San Joaquin River merged with Fresno Slough, a wider and deeper waterway than the San Joaquin River. Fresno Slough was part of an intricate slough system that exchanged water between the Tulare Lake Basin and the San Joaquin River. Downstream from Mendota, the San Joaquin River flowed through a network of large slough channels traversing extensive riparian woodland, tule marshes, and backwater ponds until it joined with the Merced River. Downstream from this point, the floodplain was more confined and the river exhibited a highly sinuous pattern of rapid channel meander, which created a rich complex of oxbow lakes, backwater sloughs, ponds, and sand bars. In its lower sections just upstream from the Delta, the river formed low natural levees approximately 6 feet high (The Bay Institute 1998).

The San Joaquin River has changed dramatically since the early part of the 20th century. The river is now largely confined within constructed levees and bounded by agricultural and urban development, flows are regulated through dams and water diversions, and floodplain habitats have been fragmented and reduced in size and diversity (McBain and Trush 2002). As a result, wildlife habitat has substantially changed from historic conditions. The presence of Friant Dam reduces the frequency of scouring flows; consequently, the vegetation succession of riparian scrub to forest is no longer balanced by periodic loss of forest to the river because of erosion and appearance of new riparian scrub on sand and gravel bars. In addition, operation of Friant Dam has caused gradually declining flows in spring, which are periodically necessary to disperse seed of willows and cottonwoods, and establish seedlings of these riparian tree and shrub species. Drought conditions caused by diversions have also caused a loss of riparian vegetation in several reaches of the river, and urban and agricultural development has caused a gradual loss in the area available for riparian habitat (Bureau of Reclamation 1998).

Federal and State wildlife preserves have been established to conserve, protect, and enhance migratory waterfowl habitat and native ecological communities of the San Joaquin Valley. The Mendota Wildlife Area and the Alkali Sink Ecological Reserve are located approximately 4 miles to the south of the San Joaquin River at River Mile 210. The Alkali Sink Ecological Reserve is home to many sensitive species, including blunt-nosed leopard lizard, palmate-bracted bird's beak, and Hoover's woolly star. The Mendota Wildlife Area, which is hydraulically connected to Fresno Slough, is home to numerous waterfowl and wading birds.

7.1.2 Project Area

The Project area contains 20 wildlife habitat types, including one tree-dominated, three shrub-dominated, five herbaceous-dominated, three aquatic, six developed, and two non-vegetated habitat types (Figure 7-1). The habitat types were classified by vegetative cover type, which is based on vegetation structure and plant species composition. For example, shrub-dominated communities were classified as scrub due to the structure of the vegetation and then further categorized as willow or riparian scrub depending on the dominant plant species present. Generally, the habitat types were defined following the California Wildlife-Habitat Relationships System (WHR) (WHR 2010). In some instances, habitats were defined following Holland (1986) or Moise and Hendrickson (2002), depending on what best represented the habitats within the Project area. Descriptions of each habitat type are provided below.

Table 7-1 lists the habitat types and their acreage within the Project area. Approximately 90 percent of the habitat within the Project area was confirmed through on-site surveys in 2010 and 2011, when Interim Flows had begun to modify 2009 conditions; however, due to restricted access, the remaining area was assessed using aerial photograph interpretation. Additional details regarding wildlife habitats (including survey methods and additional habitat descriptions) are available in the *Mendota Pool Bypass and Reach 2B Improvements Project Technical Memorandum on Environmental Field Survey Results* (San Joaquin River Restoration Program [SJRRP] 2011a).

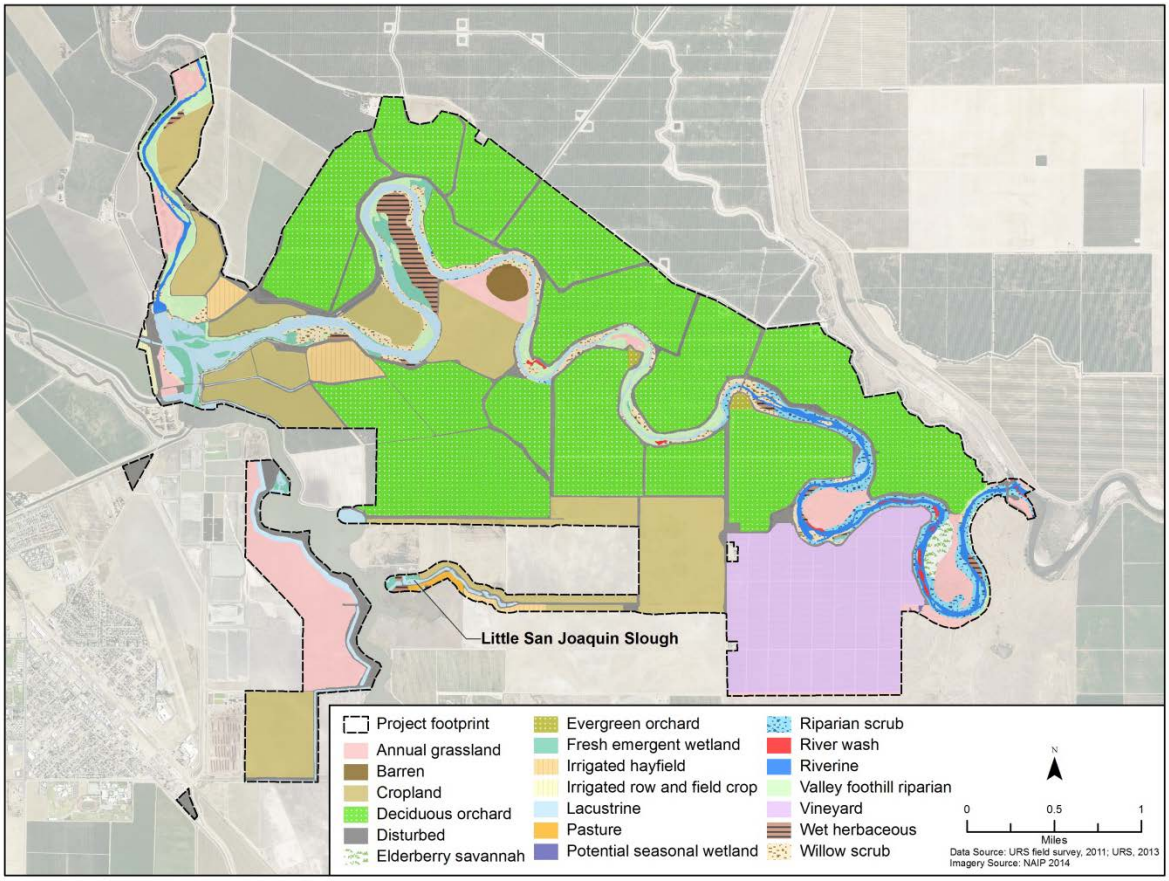

Figure 7-1.
Wildlife Habitat

Table 7-1.
Wildlife Habitat Types Mapped in the Project Area

Category	Habitat Type	Total Area (Acres)
Tree Dominated	Valley foothill riparian	153
Shrub Dominated	Elderberry savannah	23
	Riparian scrub	99
	Willow scrub	122
Herbaceous Dominated	Annual grassland	376
	Fresh emergent wetland	65
	Pasture	8
	River wash	8
	Wet herbaceous	69
Aquatic	Lacustrine	249
	Potential seasonal wetland	1
	Riverine	97

Table 7-1.
Wildlife Habitat Types Mapped in the Project Area

Category	Habitat Type	Total Area (Acres)
Developed	Cropland	896
	Irrigated hayfield	80
	Irrigated row and field crop	10
	Deciduous orchard	2,498
	Evergreen orchard	10
	Vineyard	624
Non-vegetated	Barren	25
	Disturbed	481
Total		5,894

Note: The total acreage value is calculated independently of the specific habitat acreage values; therefore, due to rounding, the value differs slightly from the sum of the habitat acres reported, which is 5,798 acres.

Tree-Dominated Habitats

Valley Foothill Riparian. As described by WHR (2010), valley foothill riparian habitat is characterized by mature riparian forest of winter deciduous trees that is generally associated with areas of floodplains and low-velocity flows with gravely or rocky soils. The typical dominant canopy species in this habitat, within the Project area, is Fremont cottonwood (*Populus fremontii*). Typical dominant subcanopy tree species include Goodding's black willow (*Salix gooddingii*), Oregon ash (*Fraxinus latifolia*), and blue elderberry (*Sambucus mexicana*). Typical understory shrub species include wild rose (*Rosa californica*), buttonbrush (*Cephalanthus occidentalis*), sandbar willow (*Salix exigua*), and, in some areas, California blackberry (*Rubus ursinus*). In the Project area, this habitat type primarily occurs in narrow bands between the river margins and croplands and therefore may be more similar to valley foothill riparian edge habitat (that is, habitat on the edge of a valley foothill riparian forest, as opposed to the interior). Accordingly, cover may be less dense than would be expected in the interior of a stand of valley foothill riparian forest, and the "forest" may appear less mature.

Shrub-Dominated Habitats

Elderberry Savannah. As described by Holland (1986), elderberry savannah habitat is characterized by a winter-deciduous shrub savannah dominated by blue elderberry (*Sambucus mexicana*) and an understory of nonnative grasses. The habitat is generally associated with alluvial soil and areas of floodplains. In natural stands this habitat typically succeeds into riparian vegetation. Typical understory species present in the Project area include tarweed (*Hemizonia* species), mustard (*Brassica* species), California wild rose (*Rosa californica*), and annual grasses.

Riparian Scrub. As described in Moise and Hendrickson (2002), riparian scrub habitat is characterized by a mix of semishrubby perennials and woody vines. In the Project area, some areas also include a layer of shrub-like trees, including tobacco tree (*Nicotiana glauca*), blue elderberry (*Sambucus mexicana*), buttonbrush (*Cephalanthus occidentalis*),

sandbar willow (*Salix exigua*), and Goodding's black willow (*Salix gooddingii*). Common understory species include California wild rose (*Rosa californica*), mugwort (*Artemisia douglasiana*), jimson weed (*Datura* species), cocklebur (*Xanthium strumarium*), nettle (*Urtica dioica*), sunflower (*Helianthus annuus*), tarweed (*Hemizonia* species), mustard (*Brassica* species) and lupin (*Lupinus* species).

Riparian scrub is distinguished from willow scrub habitat, described below, by the fact that riparian scrub is dominated by multiple species (i.e., willow and non-willow riparian species), whereas willow scrub is dominated by stands of willow species. In the Project area, much of the riparian scrub occurs along highly channelized portions of the river or areas that are subject to frequent disturbance.

Willow Scrub. As described by Moise and Hendrickson (2002), willow scrub habitat is characterized by winter deciduous, shrubby, streamside willow thickets that are generally associated with areas subject to flooding or disturbance. Typical dominant species present in the Project area include Goodding's black willow (*Salix gooddingii*) and sandbar willow (*Salix exigua*). Typical understory species include wild rose (*Rosa californica*). In the Project area, much of the willow scrub occurs along sand and gravel bars and in small patches along the banks of the San Joaquin River.

Herbaceous-Dominated Habitats

Annual Grassland. As described by WHR (2010), annual grassland habitat is characterized by open grassland dominated by annual, nonnative grass species that are generally found on flat plains or rolling hills. Typical dominant grass species include wild oats (*Avena fatua*), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), red brome (*Bromus madritensis*), wild barley (*Hordeum marinum*), and foxtail fescue (*Vulpia myuros*). Common forbs typically associated with this habitat include broadleaf filaree (*Erodium botrys*), redstem filaree (*Erodium cicutarium*), turkey mullein (*Eremocarpus setigerus*), true clovers (*Trifolium* species), bur clover (*Medicago minima*), and prickly popcorn flower (*Cryptantha muricata*). Tarweed (*Hemizonia* species) is common in some grassland areas.

In the Project area, annual grassland habitat occurs in several places, including on a less disturbed piece of land in the eastern portion of the Project area, south of the San Joaquin River and adjacent to elderberry savannah and riparian scrub habitat. Other areas mapped as annual grassland typically had a strong ruderal vegetation component.

Fresh Emergent Wetland. As described by WHR (2010), fresh emergent wetland habitat is characterized by erect, rooted, herbaceous, water-intense plants most commonly found on level to gently rolling topography, in depressions or at the edge of rivers or lakes in areas that are flooded frequently. Common species on the upper margins of this habitat in the Project area include yerba mansa (*Anemopsis californica*) and on more alkali sites, saltgrass. Common species on more saturated sites include common cattail (*Typha latifolia*) and tule bulrush (*Scirpus acutus* var. *occidentalis*). Fresh emergent wetland habitat, in the Project area, primarily occurs along the margins of and sometimes as small "islands" within lacustrine habitats, including portions of the San Joaquin River, Fresno

Slough, and Little San Joaquin Slough. This habitat type may blend into the wet herbaceous habitat type, described below.

Pasture. As described by WHR (2010), pasture habitat is characterized by irrigated and grazed habitat that consists of a mix of perennial grasses and legumes that provide 100 percent canopy closure planted on flat and gently rolling terrain. Species occurring in this habitat type include Bermuda grass (*Cynodon dactylon*), white melilot (*Melilotus albus*), and ryegrasses (*Lolium* species). Various annual grasses are also present. This habitat type is present south of Little San Joaquin Slough.

Riverwash. As described by Moise and Hendrickson (2002), riverwash habitat is characterized by scoured banks and bars within or adjacent to the active river channel, without significant vegetative cover. In the Project area, this habitat type is present at a few locations along the San Joaquin River.

Wet Herbaceous. Wet herbaceous habitat is characterized by annual and perennial herbaceous vegetation growing in areas with a high water table or subject to frequent flooding. These areas are typically wetter than annual grassland but not wet enough to be classified as fresh emergent wetland. Vegetation is lower-growing than in riparian scrub or valley foothill riparian habitats. Common species occurring in this habitat type include white melilot (*Melilotus albus*), Indian dogbane (*Apocynum cannabinum*), Bermuda grass (*Cynodon dactylon*), ryegrasses (*Lolium* species), tarweed (*Hemizonia* species), and cocklebur (*Xanthium strumarium*). Wet herbaceous habitat in the Project area may blend into other riparian and wetland habitats.

Aquatic Habitats

Lacustrine. As described by WHR (2010), lacustrine habitat is characterized by inland depressions or dammed riverine channels containing standing water. Due to the presence of Mendota Dam, large portions of aquatic habitat in the Project area hold water throughout the summer.

Potential Seasonal Wetland. In one portion of the Project area where access has not been granted, two features have been identified from aerial photographs as potential seasonal wetlands. The features appear to be artificially inundated and may be more appropriately described as agricultural wetlands, but since access was not available the exact character of these features remains unknown.

Riverine. As described by WHR (2010), riverine habitat is characterized by intermittent or continually running water of rivers or streams. There are three zones in this habitat type: the open water zone, submerged zone and the shore zone. Riverine habitat is present upstream of the San Mateo Avenue crossing, where water visibly flows.[1] Fresh emergent wetland habitat is mapped separately from riverine habitat, although it may be within the shore or submerged zone as defined by WHR (2010).

[1] Flows observed during the habitat assessment upstream of the San Mateo Avenue crossing surveys are due to Interim Flows.

Developed Habitats

Developed habitats in the Project area consist of agricultural lands, which dominate the area and occur in most portions of the Project area outside of the lands immediately adjacent to the San Joaquin River. Developed habitats are described by WHR (2010) as follows.

Cropland. Cropland habitat is generally characterized by a variety of annual crops, typically grown as a monoculture, which is planted in spring and harvested in summer or fall. In the Project area, an effort was made to define cropland more specifically based on the type of crop, as described below. The more general cropland habitat type was used when a more specific habitat type could not be assigned, such as where agricultural fields were temporarily fallow (this category may include temporary land fallowing/crop idling acreage) or had recently been tilled in preparation for planting a new crop at the time of the habitat assessment surveys. Fallow fields may be regularly tilled or planted with cover crops, which differentiates them from barren habitat (described below). Croplands occur in the Project area both north and south of the river.

Irrigated Hayfield. Irrigated hayfield habitat is characterized by alfalfa fields and grass hayfields where plowing may occur annually but often is less frequent. Alfalfa is typically planted as a monoculture and usually exists unplowed for approximately 3 years or more. Grass hayfields are characterized by irrigated, intensively mowed and managed grass crops with nearly 100 percent cover. In addition, occasionally "native" hayfields are irrigated to enhance their productivity. Native hayfields may include introduced grasses and forbs, but they are managed less intensively and contain a variety of naturally occurring species as well. Irrigated hayfields are found in the western portion of the Project area and near Little San Joaquin Slough.

Irrigated Row and Field Crops. Irrigated row and field crop habitat is characterized by annual or perennial green vegetable crops such as asparagus, broccoli, lettuce, cucumbers, fruits from strawberries to melons, and root vegetables such as carrots, potatoes, and beets. Cotton is also grown as an irrigated row crop. Most of these crops are grown in rows and canopy cover varies from 100 percent to crops with significant bare areas. These crops are also managed in a crop rotation system. See Section 16.1 for a discussion of specific agricultural crops and tree fruits. Irrigated row and field crops occur near the Mendota Dam area.

Deciduous Orchard. Deciduous orchard habitat is characterized by deciduous trees that produce almonds, apples, apricots, cherries, figs, nectarines, peaches, pears, pecans, pistachios, plums, pomegranates, prunes, and walnuts. Deciduous orchards typically consist of a single species of deciduous trees planted in linear, uniformly spaced rows where the crowns typically touch. Orchards in the Project area were clearly managed to reduce understory growth at the time of the habitat assessment and therefore the typical understory of low-growing grasses, legumes, and other herbaceous plants was sparse or absent from this habitat type. See Section 16.1 for a discussion of specific agricultural crops and tree fruits. Deciduous orchards are found in the Project area both north and south of the river.

Evergreen Orchard. Evergreen orchard habitat is characterized by evergreen trees that produce avocados, dates, olives, and citrus fruits. Evergreen orchard habitat typically consists of evergreen trees planted in linear, uniformly spaced rows where crowns typically do not touch. Orchards in the Project area were managed to reduce understory growth at the time of the habitat assessment surveys and therefore the typical understory composed of low-growing grasses, legumes, and other herbaceous plants was sparse or absent from this habitat type. Evergreen orchards are found in the Project area near deciduous orchards at two river bends.

Vineyard. Vineyard habitat is characterized by a single species of vines, usually supported on wood and wire trellises of boysenberries, olallieberries, raspberries, or grapes planted in rows. Typically the ground under the vines is sprayed with herbicides to prevent growth of herbaceous plants, and the ground between the rows of vines is often kept open and grasses or other herbaceous plants may be planted or allowed to grow to control erosion. A vineyard is located in the southeastern portion of the Project area.

Non-vegetated Habitats

Barren. As described by WHR (2010), barren habitat is characterized by less than 2 percent total vegetation cover by herbaceous, desert, or non-wildland species and less than 10 percent cover by tree or shrub species. This habitat is limited to non-vegetated areas that have not been significantly disturbed but instead are naturally sparsely vegetated due to hydrology or other factors. This habitat does not include areas within an active river channel (Riverwash). A section of barren habitat is found in the Project area near one of the river bends.

Disturbed. As described by Moise and Hendrickson (2002), disturbed habitat is characterized by areas where it is unlikely or impossible to find significant native vegetation, which includes permanent roads or roads at least two lanes in width, canals, levees, structures and associated landscaping, parks, golf courses, active gravel mines or other areas maintained free of vegetation by regular disturbance. This habitat is present throughout the Project area in the form of roads and structures associated with agricultural activities.

7.1.3 Special-Status Wildlife Species

Special-status wildlife species are defined here as wildlife species that meet any of the following requirements.

- Federally-listed as endangered or threatened or proposed for Federal listing under the Federal Endangered Species Act (ESA) (50 Code of Federal Regulations [CFR] 17.11 [listed animals]).
- Federal candidates for possible future listing as threatened or endangered under the ESA (73 Federal Register [FR] 75176, December 10, 2008).
- State listed as endangered or threatened, proposed for State listing, or State candidate for listing under the California Endangered Species Act (CESA) (Cal. Code Regs., tit. 14, § 670.5).

- State fully protected (Fish & G. Code, §§ 3511 [birds], 4700 [mammals], 5050 [amphibians and reptiles]).
- U.S. Fish and Wildlife Service (USFWS) Bird of Conservation Concern species (USFWS 2008).
- California Department of Fish and Wildlife (DFW) Species of Special Concern (DFW 2011).

A total of 36 special-status wildlife species were evaluated for their potential to occur in the Project area. The list of species evaluated was compiled based on a review of all California Natural Diversity Database (CNDDB) records from the Mendota Dam U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle, the eight surrounding quadrangles (Jamesan, Tranquillity, Coit Ranch, Firebaugh, Poso Farm, Firebaugh NE, Bonita Ranch, and Gravelly Ford), and the area within 10 miles of Reach 2B (DFW 2009), as well as a USFWS Sacramento Field Office species list for the Mendota Dam quadrangle (USFWS 2009), and the Audubon Society Important Bird Area species list for the nearby Mendota Wildlife Area (Audubon Society 2009). Based on these sources, relevant field observations, and the presence or absence of suitable habitat, each species was designated as having high, moderate, low, or no potential to occur within the Project area. Special-status wildlife with a moderate or high potential to occur[2] are summarized in Table 7-2. Federally- and State-listed, proposed, candidate and fully protected wildlife species are listed in Table 7-3. Special-status wildlife species that lack ESA or CESA listing status or State fully protected status are listed in Table 7-4. Details regarding suitable habitat for each of these special-status wildlife species and the designations regarding the potential to occur in the Project area are presented and further explained in Mendota Pool Bypass and Reach 2B Improvements Project *Technical Memorandum on Environmental Field Survey Results* (SJRRP 2011a).

Table 7-2.
Special-Status Wildlife Species with a Moderate or High Potential to Occur

Scientific Name	Common Name	Federal Status	State Status
Federally-Listed, State-Listed, and Fully Protected Wildlife Species			
Invertebrates			
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	FT	--
Reptiles			
Gambelia sila	blunt-nosed leopard lizard	FE	SE and FP
Thamnophis gigas	giant garter snake	FT	ST
Birds			
Buteo swainsoni	Swainson's hawk	MBTA	ST
Elanus leucurus	white-tailed kite	MBTA	FP
Grus canadensis tabida	greater sandhill crane	MBTA	FP
Agelaius tricolor	tricolored blackbird	BCC, MBTA	SE

[2] *Branchinecta* species are listed in Table 7-2 despite having a low potential to occur for reasons explained in Section 7.3.3, Impacts and Mitigation Measures.

Table 7-2.
Special-Status Wildlife Species with a Moderate or High Potential to Occur

Scientific Name	Common Name	Federal Status	State Status
Mammals			
Dipodomys nitratoides exilis	Fresno kangaroo rat	FE	SE
Other Special-Status Wildlife Species			
Reptiles			
Actinemys marmorata	western pond turtle	--	SSC
Anniella pulchra pulchra	silvery legless lizard	--	SSC
Masticophis flagellum ruddocki	San Joaquin coachwhip	--	SSC
Phrynosoma blainvillii	coast horned lizard	--	SSC
Birds			
Anser albifrons elgasi	greater white-fronted goose	MBTA	SSC
Asio flammeus	short-eared owl	MBTA	SSC
Athene cunicularia	burrowing owl	BCC, MBTA	SSC
Aythya americana	redhead	MBTA	SSC
Charadrius montanus	mountain plover	BCC, MBTA	SSC
Circus cyaneus	northern harrier	MBTA	SSC
Grus canadensis canadensis	lesser sandhill crane	MBTA	SSC
Lanius ludovicianus	loggerhead shrike	BCC, MBTA	SSC
Numenius americanus	long-billed curlew	BCC, MBTA	--
Pelecanus erythrorhynchos	American white pelican	MBTA	SSC
Xanthocephalus xanthocephalus	yellow-headed blackbird	MBTA	SSC
Mammals			
Eumops perotis californicus	western mastiff bat	--	SSC
Lasiurus blossevillii	western red bat	--	SSC
Taxidea taxus	American badger	--	SSC

U.S. Fish and Wildlife Service and Federal Listing Categories:
BCC = Bird of Conservation Concern
FE = Federally Listed as Endangered
FT = Federally Listed as Threatened
MBTA = Protected under the Migratory Bird Treaty Act

California Department of Fish and Wildlife State Listing Categories:
FP = Fully Protected
SE = State Listed as Endangered
SSC = Species of Special Concern
ST = State Listed as Threatened

Table 7-3.
Federally- and State-Listed or Fully Protected Wildlife Species

Scientific Name **Common Name**	**Federal/ State Status**	**Preferred Habitat**	**Potential to Occur in the Project area**
Invertebrates			
Branchinecta longiantenna longhorn fairy shrimp	FE/--	Found in vernal pools, particularly clear to turbid grass-bottomed pools and clear-water pools in sandstone depressions.	Low: No suitable habitat observed during habitat assessment surveys. Suitable habitat absent from Project area.
Branchinecta lynchi vernal pool fairy shrimp	FT/--	Found in vernal pools, particularly small, clear-water sandstone depression pools and grassy swale, earth slump, or basalt-flow depression pools.	Low: No suitable habitat observed during habitat assessment surveys. Suitable habitat absent from Project area.
Desmocerus californicus dimorphus valley elderberry longhorn beetle	FT/--	Elderberry shrubs with stem diameters of 2 to 8 inches. Species always found close to host plant. Larvae may remain in stems for up to 2 years.	High: Elderberry shrubs abundant in Project area. Old exit holes observed during protocol surveys.
Amphibians			
Ambystoma californiense California tiger salamander	FT/ST	Grasslands and understory of valley-foothill hardwood habitats. Require vernal pools or other seasonal water sources for breeding and mammal burrows or other underground refuges.	Low: Project area outside known current and historic range. No suitable habitat observed during habitat assessment surveys. Suitable habitat absent from Project area.
Rana draytonii California red-legged frog	FT/SSC	Pools with emergent vegetation, typically without predatory fish, and upland hibernacula, such as small mammal burrows or moist leaf litter.	Low: Assumed absent from the Project area and vicinity, based on current known distribution, presence of two invasive ranid frog species, and presence of invasive, predatory fish species.
Reptiles			
Gambelia sila blunt-nosed leopard lizard	FE/SE and FP	Sparsely vegetated alkali and desert scrub habitats, in areas of low topographic relief. Seek cover in mammal burrows, under shrubs or structures such as fence posts.	Moderate: No suitable habitat observed during habitat assessment surveys. Suitable habitat absent from Project area, with possible exception of unsurveyed land in southeast of the Project area.
Thamnophis gigas giant garter snake	FT/ST	Marshes, low-gradient streams, canals, and irrigation ditches with dense emergent vegetation, water persisting throughout the active period, open areas along water margins, and access to upland habitat for hibernation and escape from flooding.	High: Previously detected in Project area (DFW 2009). Suitable habitat observed in portions of the San Joaquin River affected by Mendota Dam, and in Fresno Slough.

Table 7-3.
Federally- and State-Listed or Fully Protected Wildlife Species

Scientific Name **Common Name**	**Federal/ State Status**	**Preferred Habitat**	**Potential to Occur in the Project area**
Birds			
Agelaius tricolor tricolored blackbird	BCC, MBTA/SE	Typically nests next to open water in freshwater marsh with extensive emergent or riparian vegetation. Breeding colonies also reported in grain fields. Forages in grasslands, wetland habitats, and some agricultural areas.	High: Observed along San Joaquin River corridor during a 19 May 2010 site visit.
Aquila chrysaetos golden eagle	MBTA, GBEPA/FP	Found in rolling hills, mountain areas, sage-juniper flats, or deserts. Forages in open areas with low vegetation. Nests on cliff faces or in large trees.	Low: No eagles or suitable eagle nesting habitat observed during habitat assessment survey. May occur during foraging or wintering but nesting not expected.
Buteo swainsoni Swainson's hawk	MBTA/ST	Nests in riparian areas, oak woodlands, and isolated and roadside trees close to grassland or agricultural foraging habitat.	High: Swainson's hawk nests previously documented in Project area (DFW 2009). Two pairs present in Project area during habitat assessment survey.
Coccyzus americanus occidentalis western yellow-billed cuckoo	FC, BCC, MBTA/SE	Large blocks of riparian habitats (particularly woodlands with willow and cottonwood) along floodplains of larger river systems. Dense understory foliage important.	Low: Project area located outside of current known range. Suitable habitat limited and not observed during habitat assessment survey. Not likely to occur due to extended absence from the region.
Elanus leucurus white-tailed kite	MBTA/FP	Prefers grasslands, oak woodlands, riparian scrub, and savannas. Forages in wetland and grassland areas.	High: Species observed in the Project area during valley elderberry longhorn beetle surveys.
Grus canadensis tabida greater sandhill crane	MBTA/FP	Nests in wet meadows and emergent marshes. Forages in wet meadows, marshes, freshwater margins, and less frequently grasslands and croplands.	High: Sandhill cranes observed flying nearby during valley elderberry longhorn beetle protocol survey –may be different subspecies. Likely an uncommon visitor during nonnesting season.
Riparia riparia bank swallow	MBTA/ST	Colonial nester primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near water to dig nest cavity.	Low: No suitable nesting habitat observed during habitat assessment survey. Suitable nesting habitat no longer present at historic Mendota Pool occurrence location.

Table 7-3.
Federally- and State-Listed or Fully Protected Wildlife Species

Scientific Name **Common Name**	**Federal/ State Status**	**Preferred Habitat**	**Potential to Occur in the Project area**
Vireo bellii pusillus Least Bell's vireo	FE/SE/ MBTA	Nests in riparian woodlands, especially willows and other shrubs, along low elevation riverine areas. Forages in riparian and adjacent uplands.	Low: No individuals were found during protocol surveys. Nearest known occurrence is San Luis Reservoir (approximately 55 miles northwest)
Mammals			
Ammospermophilus nelsoni Nelson's antelope squirrel	--/ST	Merced County south to Kings, Tulare and Kern counties, at elevations ranging from 200 to 1,200 feet. Dry, sparsely vegetated loam soils with widely scattered shrubs, forbs, and grasses in broken terrain with gullies and washes.	Low: Species not observed during habitat assessment survey, although California ground squirrels were observed. Project area is north of current range of this species.
Dipodomys nitratoides exilis Fresno kangaroo rat	FE/SE	Restricted to native grasslands in Fresno County within the San Joaquin Valley; nearly level, light, friable soils in chenopod scrub and grassland communities.	Moderate: Despite efforts to trap this species, it has not been detected at nearby sites where it was present in 1992. Kangaroo rat sign (e.g., tail drags, potential burrows) was observed in the Project area (primarily east and west loops), although 2011 trapping efforts within the Project area captured only Heermann's kangaroo rat.
Vulpes macrotis mutica San Joaquin kit fox	FE/ST	Grassland or grassy open stages with scattered shrubby vegetation; requires loose-textured sandy soils for burrowing; requires suitable prey base of small rodents.	Low: Although habitat potentially offering denning and foraging opportunities was observed during the habitat assessment survey, prior surveys in portions of the Project area have failed to confirm the presence of this species, and it is presumed extirpated in the area by USFWS (USFWS 2010).

U.S. Fish and Wildlife Service and Federal Listing Categories:
BCC = Bird of Conservation Concern
FC = Candidate for Federal Listing
FD = Federally Delisted
FE = Federally Listed as Endangered
FT = Federally Listed as Threatened
GBEPA = Protected under the Golden and Bald Eagle Protection Act
MBTA = Protected under the Migratory Bird Treaty Act

California Department of Fish and Game State Listing Categories:
FP = Fully Protected
SC = Candidate for State Listing
SE = State Listed as Endangered
SSC = Species of Special Concern
ST = State Listed as Threatened

Table 7-4.
Other Special-Status Wildlife Species

Scientific Name **Common Name**	**Federal/ State Status**	**Preferred Habitat**	**Potential to Occur in the Project area**
Amphibians			
Spea hammondii western spadefoot	--/SSC	Grassland and valley-foothill hardwood woodlands, vernal pools or seasonal wetlands are essential for egg laying.	Low: No suitable habitat observed during habitat assessment surveys. Suitable habitat absent from Project area.
Reptiles			
Actinemys marmorata western pond turtle	--/SSC	Ponds, marshes, rivers, streams, irrigation ditches, and vernal pools; with basking sites and suitable upland habit for egg laying.	High: Species observed in the Project area during habitat assessment survey, including likely nest.
Anniella pulchra pulchra silvery legless lizard	--/SSC	Sand dunes or sandy soil, with litter; also wooded stream edges, and occasionally desert-scrub. Bush lupine often indicates suitable conditions. Found in leaf litter, under rocks, logs, and driftwood.	High: Species known from immediately adjacent to the Project area and suitable habitat present at various locations in the Project area.
Masticophis flagellum ruddocki San Joaquin whipsnake	--/SSC	Open, dry, treeless areas, including grassland and saltbush scrub. Takes refuge in rodent burrows, under shaded vegetation, and under surface objects.	High: Recent nearby occurrences and suitable habitat present in the Project area.
Phrynosoma blainvillii coast horned lizard	--/SSC	Coastal sage, chaparral, and other brushy, shrubby vegetation habitats that provide a low shrub structure; Overwinters in small mammal burrows.	High: Recent nearby occurrences, suitable habitat and some native ant colonies present in the Project area.
Birds			
Accipiter cooperii Cooper's hawk	MBTA/WL	Typically found in patchy woodlands. Nests and forages near open water and wetland vegetation.	High: Observed along San Joaquin River corridor during habitat assessment survey.
Anser albifrons elgasi greater white-fronted goose	MBTA/SSC	Prefers moist and wet environments, including freshwater wetlands, croplands, and pastures. Breeds in Alaska.	High: Likely present during winter and migratory periods. August habitat assessment survey did not provide opportunity to observe this species.
Asio flammeus short-eared owl	MBTA/SSC	Open grasslands, prairies, dunes, irrigated fields, and wetlands. Nests on the ground in tall grass stands.	High: Observed along San Joaquin River corridor during habitat assessment survey and during valley elderberry longhorn beetle surveys.

Table 7-4.
Other Special-Status Wildlife Species

Scientific Name **Common Name**	**Federal/ State Status**	**Preferred Habitat**	**Potential to Occur in the Project area**
Athene cunicularia burrowing owl	BCC, MBTA/SSC	Open, dry, annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation, with small mammal burrows for nesting and roosting.	Moderate: Observed flying just north of the Project area. Suitable habitat is present within the Project area, but no sign of this species was observed during wildlife habitat assessment survey.
Aythya americana redhead	MBTA/SSC	Nests near freshwater emergent wetlands and areas of deep, open water.	Moderate: Although suitable habitat is present in the Project area, this species was not observed during the habitat assessment survey.
Charadrius montanus mountain plover	BCC, MBTA/SSC	Roosts and forages in short grasslands, freshly plowed fields, and bare ground with flat topography. Prefers fallow, grazed, or burned areas and alkali flats with burrowing rodents.	Moderate: Potential wintering and foraging habitat is present in the Project area.
Circus cyaneus northern harrier	MBTA/SSC	Nests and forages in open habitats including freshwater marshes and weedy edges of rivers and streams. Also found in agricultural areas such as pastures and some croplands.	High: Observed along San Joaquin River corridor during habitat assessment survey.
Falco columbarius merlin	MBTA/WL	Occurs in coast, grasslands, savannas, woodlands, coniferous forests, wetlands, and occasionally desert habitats. Requires dense tree stands near bodies of water.	High: Observed in Project area near Fresno Slough during valley elderberry longhorn beetle protocol surveys.
Grus canadensis canadensis lesser sandhill crane	MBTA/SSC	Forages in agricultural fields, pastures, and mowed to grazed grasslands. Roosts in shallow water within wetland habitats.	Moderate: Potential wintering and foraging habitat is present in the Project area.
Lanius ludovicianus loggerhead shrike	BCC, MBTA/SSC	Breeds in shrubland or open woodlands. Requires tall shrubs/trees for hunting perches and nests. Uses riparian edges in the Central Valley.	High: Observed along San Joaquin River corridor during habitat assessment survey.
Larus californicus California gull	MBTA/WL	Preferred inland habitat includes riverine, lacustrine, and cropland habitats.	Moderate: Potential wintering and foraging habitat is present in the Project area. Observed flying over the Project area.
Numenius americanus long-billed curlew	BCC, MBTA/WL	Winters in upland herbaceous areas and croplands.	High: Observed in the Project area during valley elderberry longhorn beetle surveys. Potential wintering and foraging habitat is present in the Project area.

Table 7-4.
Other Special-Status Wildlife Species

Scientific Name **Common Name**	**Federal/ State Status**	**Preferred Habitat**	**Potential to Occur in the Project area**
Pandion haliaetus osprey	MBTA/WL	Found near large, open, fish-bearing waters. Nests and roosts on large tree, snags, and cliffs.	Moderate: Potential wintering and foraging habitat is present in the Project area.
Pelecanus erythrorhynchos American white pelican	MBTA/SSC	Forages in shallow inland waters such as marshes, canals and lake or river edges.	High: Observed at Mendota Pool during habitat assessment survey.
Phalacrocorax auritus double-crested cormorant	MBTA/WL	Found in riverine habitats within the Central Valley.	High: Observed at Mendota Pool during habitat assessment survey.
Plegadis chihi white-faced ibis (rookery site)	MBTA/WL	Forages in emergent freshwater wetlands and flooded croplands/pastures. Roosts in dense wetland vegetation.	Moderate: Observed flying over the Project area. Potential rookery and foraging habitat present in the Project area.
Xanthocephalus xanthocephalus yellow-headed blackbird	MBTA/SSC	Nests in marshes with tall emergent vegetation and areas of relatively deep water.	High: Observed along San Joaquin River corridor and Fresno Slough during valley elderberry longhorn beetle protocol surveys.
Mammals			
Eumops perotis californicus western mastiff bat	--/SSC	Roosts in crevices in cliff faces, high buildings, and tunnels; forages in arid, semi-arid habitat-coniferous and deciduous woodlands, coastal scrub, grasslands, and chaparral.	High: Although evidence of roosting habitat was not observed during the habitat assessment survey, may forage over much of the Project area.
Lasiurus blossevillii western red bat	--/SSC	Roosts primarily in trees, typically adjacent to open fields or streams, which are protected above and open below for foraging; prefers habitat edges and mosaics with trees.	High: May roost in trees in riparian habitat in the Project area, and may forage over much of the Project area.
Taxidea taxus American badger	--/SSC	Grasslands, savannas, and mountain meadows; require friable soils, and relatively open, uncultivated ground; requires suitable prey base of burrowing rodents.	Moderate: Although potentially suitable habitat is present in the Project area, no sign of this species was observed during the habitat assessment survey.

Key:

U.S. Fish and Wildlife Service and Federal Listing Categories:
BCC = Bird of Conservation Concern
FC = Candidate for Federal Listing
FD = Federally Delisted
FE = Federally Listed as Endangered
FT = Federally Listed as Threatened
MBTA = Protected under the Migratory Bird Treaty Act

California Department of Fish and Game State Listing Categories:
FP = Fully Protected
SC = Candidate for State Listing
SE = State Listed as Endangered
SSC = Species of Special Concern
ST = State Listed as Threatened
WL = Watch List

7.2 Regulatory Setting

7.2.1 Federal

The following subsections describe Federal laws and regulations governing the protection of wildlife resources.

Federal Endangered Species Act of 1973

The ESA (16 United States Code [USC] Sections 1531 to 1543) and subsequent amendments provide guidance for the conservation of Federally-listed species and the ecosystems on which they depend.

Prohibited Acts. Section 9 of the ESA prohibits the "take" of any fish or wildlife species listed under the ESA unless otherwise authorized by Federal regulations. The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (16 USC Section 1532:19). Two processes whereby take is allowed when it is incidental to an otherwise legal activity are described in Section 7 and Section 10, respectively. Section 9 of the ESA also prohibits the unlawful removal, damage or destruction of any endangered plant under Federal jurisdiction, or where in non-Federal areas, in knowing violation of any State law.

Interagency Consultation and Biological Assessments. Section 7 of the ESA provides a means for authorizing the "take" of threatened or endangered species by Federal agencies, and applies to actions that are conducted, permitted, or funded by a Federal agency. The statute requires Federal agencies to consult with the USFWS or National Marine Fisheries Service (NMFS), as appropriate, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species. If a proposed project "may affect" a listed species or destroy or modify critical habitat, the lead agency is required to prepare a biological assessment evaluating the nature and severity of the potential effect.

Habitat Conservation Plans. Section 10 of the ESA requires that non-Federal landowners obtaining an Incidental Take Permit from the USFWS for activities that might incidentally harm (or "take") endangered or threatened wildlife on their land. To obtain a permit, an applicant must develop a Habitat Conservation Plan that is designed to offset any harmful impacts the proposed activity might have on the species.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 USC Sections 661 to 667e et seq.) applies to any Federal project where any body of water is impounded, diverted, deepened, or otherwise modified. Project proponents are required to coordinate with USFWS and/or NMFS and the appropriate State wildlife agency.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA; USC Sections 703 to 712) makes it unlawful unless expressly authorized by permit pursuant to Federal regulations to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, offer for sale, sell, offer to purchase,

purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export at any time, or in any manner, any migratory bird, or any part, nest, or egg of any such bird."

This includes direct and indirect acts with the exception of harassment and habitat modification, which are not included unless they result in direct loss of birds, nests, or eggs. Most bird species occurring in California fall under the protection of the MBTA except those species that belong to the families not listed in any of the four treaties, such as wrentit (*Chamaea fasciata*), European starling (*Sturnus vulgaris*), California quail (*Callipepla californica*), ring-necked pheasant (*Phasianus colchicus*), and chukar (*Alectoris chukar*), among others less common in California. The MBTA is administered by USFWS Division of Migratory Bird Management.

The Migratory Bird Treaty Reform Act (Division E, Title I, Section 143 of the Consolidated Appropriations Act, 2005, Public Law 108–447) amends the MBTA (16 USC Sections 703 to 712) such that nonnative birds or birds that have been introduced by humans to the United States or its territories are excluded from protection under the Act. It defines a native migratory bird as a species present in the United States and its territories as a result of natural biological or ecological processes. This list excluded two additional species commonly observed in the United States, the rock dove (*Columba livia*) and domestic goose (*Anser domesticus*).

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC 668-668d, 54 Stat. 250) as amended, provides protection for the bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) by prohibiting the taking, possession, and commerce of such birds, their nests, eggs, or feathers unless expressly authorized by permit pursuant to Federal regulations.

Protection of Migratory Bird Populations (Executive Order 13186)

Executive Order 13186 directs each Federal agency taking actions that have or may have adverse impacts on migratory bird populations to work with the USFWS to develop a memorandum of understanding that would promote the conservation of migratory bird populations. This includes avoiding and minimizing adverse impacts on migratory bird resources when conducting agency actions, restoring and enhancing migratory bird habitats, and preventing or abating the pollution or detrimental alteration of the environment for the benefit of migratory birds.

7.2.2 State of California

The following subsections describe State laws and regulations governing the protection of biological resources.

California Endangered Species Act

The CESA (Fish & G. Code, §§ 2050 to 2085) establishes the State policy to conserve, protect, restore, and enhance threatened or endangered species and their habitats by protecting "all native species of fishes, amphibians, reptiles, birds, mammals,

invertebrates, and plants, and their habitats, threatened with extinction and those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation." Animal species are listed by DFW as threatened or endangered, and plants are listed as rare, threatened, or endangered. However, only those plant species listed as threatened or endangered receive protection under the CESA.

The CESA mandates that State agencies do not approve a project that would jeopardize the continued existence of these species if reasonable and prudent alternatives are available that would avoid a jeopardy finding. There are no State agency consultation procedures under the CESA. For projects that would affect a species that is Federally- and State-listed, compliance with ESA satisfies the CESA if DFW determines that the Federal incidental take authorization is consistent with the CESA under Section 2080.1. For projects that would result in take of a species that is State listed only, the project sponsor must apply for a take permit, in accordance with Section 2081, subdivision (b).

Fully Protected Species

Four sections of the Fish and Game Code (§§ 3511, 4700, 5050, and 5515) list 37 fully protected species. These sections prohibit take or possession "at any time" of the species listed, with few exceptions, and state that "no provision of this code or any other law will be construed to authorize the issuance of permits or licenses to 'take' the species," and that no previously issued permits or licenses for take of the species "shall have any force or effect" for authorizing take or possession.

Bird Nesting Protections

Bird nesting protections in the Fish and Game Code (§§ 3503, 3503.5, 3511, and 3513) include the following.

- Section 3503 prohibits the take, possession, or needless destruction of the nest or eggs of any bird.
- Section 3503.5 prohibits the take, possession, or needless destruction of any nests, eggs, or birds in the orders Falconiformes (new world vultures, hawks, eagles, ospreys, and falcons, among others), or Strigiformes (owls).
- Section 3511 prohibits the take or possession of fully protected birds.
- Section 3513 prohibits the take or possession of any migratory nongame bird, or part thereof, as designated in the MBTA.

To avoid violation of the take provisions, it is generally required that project-related disturbance at active nesting territories be reduced or eliminated during the nesting cycle.

Lake and Streambed Alteration

Fish and Game Code section 1600 et seq. requires DFW to be notified before any project activity that would do any of the following.

- Substantially divert or obstruct the natural flow of any river, stream, or lake.
- Substantially change or use any material from the bed, channel, or bank of any river, stream, or lake.

- Deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

The Lake and Streambed Alteration notification requirement applies to work undertaken in or near a river, stream, or lake that flows at least intermittently through a bed or channel. This includes ephemeral streams, desert washes, and watercourses with subsurface flow. It may also apply to work undertaken in the floodplain. Preliminary notification and project review generally occur during the environmental process.

When an existing fish or wildlife resource may be substantially adversely affected, DFW proposes reasonable modifications to the project to protect the resources. These modifications, or conditions, are formalized in a Lake or Streambed Alteration Agreement that becomes part of the plans, specifications, and bid documents for the project.

Natural Communities Conservation Planning Act

This act was enacted to encourage broad-based planning to provide for effective protection and conservation of the State's wildlife resources while continuing to allow appropriate development and growth (Fish & G. Code, §§ 2800 to 2835). Natural Community Conservation Plans may be implemented, which identify measures necessary to conserve and manage natural biological diversity within the planning area, while allowing compatible and appropriate economic development, growth, and other human uses.

7.2.3 Regional and Local

The following subsections describe the regional and local regulations governing the protection of wildlife resources.

San Joaquin River Management Program

The San Joaquin River Management Program was authorized by Assembly Bill (AB) 3603 and signed by the governor on September 18, 1990. Specific issues addressed by San Joaquin River Management Program include flood protection, water supply, water quality, recreation, fisheries, and wildlife. San Joaquin River Management Program produced a report in 1995, outlining recommendations in the form of projects, studies, and acquisitions.

Central Valley Joint Venture

The Central Valley Joint Venture is a self-directed coalition consisting of 20 Federal and State agencies and private conservation organizations. This partnership directs its efforts toward the common goal of providing for the habitat needs of migrating and resident birds in the Central Valley of California. The Central Valley Joint Venture was established in 1988 as a regional partnership focused on the conservation of waterfowl and wetlands under the North American Waterfowl Management Plan. It has since broadened its focus to the conservation of habitats for other birds, consistent with major national and international bird conservation plans and the North American Bird Conservation Initiative. The Central Valley Joint Venture Implementation Plan (2006)

has identified specific goals and objectives for conservation activities for waterfowl, shorebirds, waterbirds, and riparian songbirds.

Fresno County General Plan

The Open Space and Conservation Element of the Fresno County General Plan (Fresno County 2000) outlines several policies designed to protect wildlife and their habitat. These policies include the following.

- Policies OS-D.4 through OS-D.6 require the protection of wetlands, riparian areas, and the adjacent upland habitats.
- Policies OS-E.1 through OS-E.18 require the protection of wildlife habitats and movement and migration corridors through construction buffers, management practices, conservation plans, pest control, pesticide use monitoring, and conservation.

Madera County General Plan

The Madera County General Plan Policy Document (Madera County 1995) outlines several policies designed to protect wildlife and their habitat in the Agricultural and Natural Resources section of the plan. These policies include the following.

- Policies 5.D.4 through 5.D.6 require the protection of wetlands, riparian areas, and the adjacent upland habitats.
- Policies 5.E.1through 5.E.10 require the identification and protection of wildlife habitats, including habitat for rare, threatened, endangered, and indigenous species, through management practices, monitoring of pesticide use, ground squirrel control, environmental review processes, and conservation.

7.3 Environmental Consequences and Mitigation Measures

7.3.1 Impact Assessment Methodology

This section describes the methods used to evaluate potential impacts to wildlife resources. First described are the background reviews and field surveys which were used or conducted to identify wildlife resources that may be impacted by the Project. The specific methods that were used to determine Project impacts are then described.

Identification of Wildlife Resources in the Project Area

Wildlife resources potentially occurring in the Project area were identified through queries of existing databases and agency information and by field surveys. Three primary databases were reviewed to obtain special-status wildlife species occurrence data from within the Project area and vicinity: CNDDB (DFW 2009), USFWS Sacramento Field Office Species List (USFWS 2009), and Audubon Society Important Bird Area species list for the Mendota Wildlife Area (Audubon Society 2009). These and other sources of information used are described in detail in the Mendota Pool Bypass and Reach 2B Improvements Project *Technical Memorandum on Environmental Survey Results* (SJRRP 2011a, Section 3).

Wildlife habitat assessment surveys were conducted to identify and map habitats present within the Project area and to record direct and indirect wildlife observations. These surveys were conducted in the Project area from August 23 through 27, 2010. With the exception of developed agricultural areas, surveys were conducted on foot throughout portions of the Project area where access to private- or publicly-owned property had been granted, primarily parcels located south of the San Joaquin River. In developed agricultural areas and where foot surveys were not possible, either because vegetation was too dense or access was not granted, "windshield surveys" were done largely by a biologist observing from a car. For these windshield surveys, the field team used binoculars and a spotting scope to observe habitat features and wildlife from the public road. Approximately 90 percent of the habitat within the Project area was confirmed through on-site surveys.

Supplemental focused surveys were conducted for birds, valley elderberry longhorn beetle, and small mammals. A post-breeding season bird survey was conducted on August 26, 2010, and an early breeding season bird survey was conducted on March 3, 2011. Additional surveys were conducted in 2014. Protocol level surveys were conducted for valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) March 1, 2011 through March 4, 2011 and March 8, 2011 through March 9, 2011 according to the protocol established by USFWS in Conservation Guidelines for the Valley Elderberry Longhorn Beetle (USFWS 1999) in applicable areas with authorized site access. While these surveys provide an estimate for comparing alternatives, the area will need to be resurveyed for valley elderberry longhorn beetle as part of the permitting process. Small mammal trapping, focused on detection of Fresno kangaroo rat (*Dipodomys nitratoides exilis*), was conducted during summer 2011 in applicable areas with authorized site access.

Habitat data collected during the habitat assessment surveys were used in combination with existing data and aerial photograph interpretation to map wildlife habitats throughout the Project area. The habitat types were largely defined according to the California Wildlife-Habitat Relationships System (WHR 2010); however, certain habitats were also defined using Holland (1986) and Moise and Hendrickson (2002), where appropriate. Additional description of field surveys and habitat mapping are presented in the Mendota Pool Bypass and Reach 2B Improvements Project *Technical Memorandum on Environmental Survey Results* (SJRRP 2011a, Section 3).

The assessment of wildlife resources would be amended when access to the entire Project area is granted, or following additional surveys, should they be implemented before land acquisition. Surveys may determine that habitat for special-status species is not present in the Project area. For certain target species, protocol-level surveys may be conducted; if target species are not encountered, a species may be considered absent with agency approval. In these situations, impacts to those wildlife resources would not exist and implementation of the conservation measures for the protected species would no longer be required.

Impact Evaluation Methodology

The evaluation of potential impacts to wildlife resources used in the alternatives analysis is both quantitative and qualitative in nature. Wherever possible, quantitative analyses were used to determine the acres of potential habitat lost or altered for each special-status wildlife species as a result of the Project. Included in this analysis was direct habitat loss that would occur as a result of Project construction activities including grading, levee construction, and the placement of fill, and indirect habitat loss that would result from new hydrologic patterns that may over time alter existing vegetation and habitats.

To calculate these impacts, geographic information system data were used to create a master habitat layer, based on the wildlife habitat mapping effort described above, to estimate the location and area of potential habitat present within the Project area under existing conditions. Most species-specific impact calculations were generated by intersecting Project impact layers with the appropriate habitat types for each species. This methodology was used to generate impact numbers for each species for each alternative.

Species that were not analyzed using this methodology included valley elderberry longhorn beetle, blunt-nosed leopard lizard, giant garter snake, western pond turtle, and Fresno kangaroo rat. Impacts due to habitat loss for valley elderberry longhorn beetle were estimated based on a count of elderberry shrubs affected by each alternative. The analysis of blunt-nosed leopard lizard and Fresno kangaroo rat habitat loss included the results of species-specific habitat surveys. Habitat loss for giant garter snake and western pond turtle were assessed using the distribution of their aquatic habitats and an associated 200-foot upland buffer.

Potential impacts were also evaluated qualitatively for individual special-status wildlife species and potential wildlife habitat. Examples of impacts that were evaluated qualitatively include noise, motion and startle, dust, and changes in hydrology.

7.3.2 Significance Criteria

For impacts to wildlife resources, the thresholds of significance are based on Appendix G of the State California Environmental Quality Act (CEQA) Guidelines. Under National Environmental Policy Act (NEPA) Council on Environmental Quality (CEQ) Regulations, effects to wildlife resources were evaluated in terms of their context and intensity. The Project would result in a significant impact on wildlife resources if it would do any of the following.

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by DFW or USFWS.
- Interfere substantially with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

- Conflict with the provisions of an adopted habitat conservation plan, Natural Communities Conservation Plan, or other approved State, regional or local habitat conservation plans.

7.3.3 Impacts and Mitigation Measures

This section provides a project-level evaluation of direct and indirect effects of the Project Alternatives on wildlife resources. It includes analyses of potential effects relative to No-Action conditions in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. The analysis is organized by Project alternative with specific impact topics numbered sequentially under each alternative. With respect to wildlife, the environmental impact issues and concerns are:

1. Project Effects on Special-Status Invertebrate Species.
2. Project Effects on Special-Status Reptile Species.
3. Project Effects on Special-Status Bird Species.
4. Project Effects on Special-Status Mammal Species.
5. Project Effects on Wildlife Movement Corridors.
6. Long-term Habitat Improvement in Reach 2B.

Other wildlife-related issues covered in the Program Environmental Impact Statement/Report (PEIS/R) (SJRRP 2011b) are not covered here because they are programmatic in nature and/or are not relevant to the Project area.

Issues Eliminated from Further Analysis

Recovery Areas and Designated Critical Habitat. Recovery plans are non-regulatory documents developed by the USFWS to provide guidance for the recovery of threatened or endangered species. Recovery plans typically identify recovery or core areas that are important to the survival and recovery of a species. Critical habitat is a term defined and used in the ESA that refers to a specific geographic area that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection.

San Joaquin Kit Fox Recovery Area. The *Recovery Plan for the Upland Species of the San Joaquin Valley, California* (USFWS 1998) identifies recovery areas for the San Joaquin kit fox. These areas are mapped and named in the *San Joaquin Kit Fox (Vulpes macrotis mutica) 5-Year Review: Summary and Evaluation* (USFWS 2010). The Project area overlaps with Satellite Area 4: Western Madera County. Although the 5-Year Review states that the species is presumed to be extirpated from this area (locally extinct) (USFWS 2010), USFWS has indicated in Project-related correspondence that kit fox occur on, or directly adjacent to the Alkali Sink Ecological Reserve located approximately 2 miles south of the Project area (Raabe, pers. comm. 2015). Project surveys have failed to confirm the presence of this species in Project area and vicinity and Project activities are not expected to have any adverse impact to San Joaquin kit fox recovery areas. Therefore, conflicts with this recovery plan are not further addressed in this document.

Vernal Pool Recovery Area. The *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005) identifies 16 vernal pool regions that contain 41 core areas, which are considered critical to the preservation and recovery of one or more vernal pool species addressed by the plan. The Project area overlaps with the San Joaquin Valley vernal pool region but does not overlap with any of the core areas. Project activities are not expected to have any impact to core vernal pool recovery areas; and therefore, this issue is not further addressed in this document.

Fresno Kangaroo Rat Critical Habitat. Critical habitat for the Fresno kangaroo rat was designated on January 30, 1985 (50 CFR 4222–4226). This critical habitat unit does not overlap with the Project area but is located less than 2 miles south. Project activities are not expected to have any impact to Fresno kangaroo rat critical habitat; and therefore, this issue is not further addressed in this document.

Habitat Conservation Plans. There are no adopted habitat conservation plans, Natural Communities Conservation Plan, or other approved State, regional, or local habitat conservation plans in the Project area. Therefore, Project activities would not conflict with any such plans and this issue is not further addressed in this chapter.

Other Local and Regional Plans. The Fresno County General Plan and the Madera County General Plan are described under Regulatory Setting in Section 7.2.3, Regional and Local. The policies identified in these plans to protect biological resources are consistent with requirements of other State and Federal regulations. Project activities would not conflict with these policies; therefore, local and regional plans are not further addressed in Section 7.3, Environmental Consequences.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the SJRRP would be implemented, including habitat restoration, augmentation of river flows (including Restoration Flows in Reach 2B up to the existing capacity of the reach, and reintroduction of salmon. The augmentation of flows would allow riparian vegetation to naturally re-establish on river banks, especially upstream of San Mateo Avenue crossing. Without the Project in Reach 2B, however, the proposed actions in other reaches would not achieve the Settlement goals. This section describes the impacts of the No-Action Alternative. The analysis is a comparison to existing conditions, as described in Section 7.1, Environmental Setting. No mitigation is required for No-Action.

Impact WILD-1 (No-Action Alternative): *Project Effects on Special-Status Invertebrate Species.* Under the No-Action Alternative, the Project would not be implemented and there would be no construction activities in the Project area. The continuation of Restoration Flows would allow riparian vegetation to establish along previously bare banks of the San Joaquin River. This would be a potentially beneficial effect on valley elderberry longhorn beetles, as increases in riparian vegetation would likely increase the number of elderberry shrubs, the beetle's host plant. As a result, there would be a **beneficial** effect on special-status invertebrate species.

Impact WILD-2 (No-Action Alternative): *Project Effects on Special-Status Reptile Species.* Under the No-Action Alternative, the Project would not be implemented and there would be no construction activities in the Project area.

Currently, in the summer, the San Joaquin River arm of Mendota Pool extends to San Mateo Avenue, providing approximately 7 linear miles of slackwater habitat. Current management activities include drawing down Mendota Pool periodically (approximately every 2 years) during winter months for dam inspections and routing a portion of spring and early summer flood flows through Reach 2B. Although both of these activities could temporarily reduce prey base or habitat suitability for giant garter snake or western pond turtle, the margins of Mendota Pool areas near Mendota Dam and along the San Joaquin River arm are otherwise largely suitable for giant garter snake basking and foraging during most of their active period. Restoration Flows associated with the No-Action Alternative would provide flow along Reach 2B in summer months (approximately 45 cubic feet per second [cfs]) for all water year types except for critical years. This flow regime is not very different from flow through Reach 2B in recent years under Interim Flows. With the No-Action Alternative flows through Reach 2B would be limited by the existing channel capacity (additional flow would be routed through the Chowchilla Bypass), and would therefore be similar to Interim Flows.

Although changes in flow that affect water temperature and velocity in Reach 2B, particularly between Mendota Dam and San Mateo Avenue, could affect habitat suitability for giant garter snakes and western pond turtles and their prey along the river channel, the change from Interim Flows to Restoration Flows would be relatively small. These changes are not expected to affect the other special-status reptile species (blunt-nosed leopard lizard, silvery legless lizard, San Joaquin coachwhip, and coast horned lizard). The Program would implement Conservation Measure GGS-2, which includes restoration of giant garter snake habitat temporarily affected and compensation for giant garter snake habitat permanently affected (SJRRP 2011b, PEIS/R Table 2-7, page 2-65). In conclusion, there would be a **less than significant** impact to special-status reptiles.

Impact WILD-3 (No-Action Alternative): *Project Effects on Special-Status Bird Species.* Under the No-Action Alternative, the Project would not be implemented and there would be no construction activities in the Project area. The continuation of Restoration Flows would allow riparian vegetation to establish along previously bare banks of the San Joaquin River. This would provide greater foraging and nesting habitat for Swainson's hawks, white-tailed kites, and short-eared owls. No special-status birds are expected to be adversely affected. As a result, there would be a **beneficial** effect on special-status birds.

Impact WILD-4 (No-Action Alternative): *Project Effects on Special-Status Mammal Species.* Under the No-Action Alternative, the Project would not be implemented and there would be no construction activities in the Project area. The continuation of Restoration Flows would allow riparian vegetation to establish along previously bare banks of the San Joaquin River. This would provide greater foraging and roosting habitat for western red bats and more foraging habitat for western mastiff bats. There would be

no adverse effects to American badgers. As a result, there would be a **beneficial** effect on special-status mammals.

Impact WILD-5 (No-Action Alternative): *Project Effects on Wildlife Movement Corridors.* Under the No-Action Alternative, the Project would not be implemented and there would be no construction activities in the Project area. The continuation of Restoration Flows would allow riparian vegetation to establish along previously bare banks of the San Joaquin River. This would provide cover and forage for animals moving along the river course. It would also provide more habitat for migratory bird species that may use the area as a stopping point for seasonal migrations. As a result, there would be a **beneficial** effect on wildlife movement.

Impact WILD-6 (No-Action Alternative): *Long-term Habitat Improvement in Reach 2B.* Under the No-Action Alternative, Restoration Flows would allow riparian vegetation to establish along previously bare banks of the San Joaquin River. This would provide for long-term opportunities for habitat improvement in Reach 2B. As a result, there would be a **beneficial** effect on wildlife habitat.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would include construction of Project facilities including a Compact Bypass channel, a new levee system with a narrow floodplain encompassing the river channel, and the South Canal. Other key features include construction of the Mendota Pool Dike (separating the San Joaquin River and Mendota Pool), a fish barrier below Mendota Dam, the South Canal bifurcation structure and fish passage facility, modification of the San Mateo Avenue crossing, and the removal of the San Joaquin River control structure of the Chowchilla Bifurcation Structure. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

This alternative includes passive riparian habitat restoration and agricultural practices in the floodplain. It is assumed that over time wetland communities and a dense riparian scrubland would develop along the main channel and river banks, respectively. The Restoration Flows would be used to recruit new vegetation along the channel from the existing seed bank. Between the main river channel banks and the proposed levees, agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) would occur.

Table 7-5 summarizes potential habitat impacts by acreage for all vertebrate species with the potential to occur in the Project area. These acreages represent the worst-case scenario where all existing floodplain areas are assumed to be impacted. “Floodplain” primarily refers to the floodplain of the San Joaquin River and the acreage impacted under this category may be disturbed up to 3 years following construction, but is expected to eventually return to habitat. “Infrastructure” generally refers to area permanently converted to structures, levees, or roads. The borrow acreages refer to the maximum amount of habitat for each species that could be disturbed to take fill materials for levees. “Other” refers to construction staging areas, temporary access roads and other construction-related disturbances. Areas temporarily disturbed during construction would be restored to their previous contours, if feasible, and then seeded with a native

vegetation seed mixture to prevent soil erosion. Some areas, such as borrow areas, may not be feasible to restore previous contours, but these areas would be smoothed and seeded (see Section 2.2.4).

Table 7-5.
Species Habitat Potentially Affected by Alternative A

Scientific Name	Common Name	Habitat Type	Maximum Impacted Area (acres)			
			Floodplain (future habitat or agriculture)	Infrastructure (not future habitat)	Borrow (future habitat or agriculture)	Other (future habitat or agriculture)
Reptiles						
Actinemys marmorata	western pond turtle	Upland	165	21	45	11
		Aquatic	112	16	43	19
		Wetland	18	4	3	2
Anniella pulchra pulchra	silvery legless lizard	Habitat	399	55	205	27
Gambelia sila	blunt-nosed leopard lizard	Habitat	4	13	0	0
Masticophis flagellum ruddocki	San Joaquin coachwhip	Habitat	139	27	200	3
Phrynosoma blainvillii	coast horned lizard	Habitat	210	41	201	3
Thamnophis gigas	giant garter snake	Upland	165	21	45	11
		Aquatic	112	16	43	19
		Wetland	18	4	3	2
Birds						
Agelaius tricolor	tricolored blackbird	Foraging	346	135	350	23
		Nesting	118	27	38	8
Anser albifrons elgasi	greater white-fronted goose	Foraging	210	26	53	21
Asio flammeus	short-eared owl	Foraging and Nesting	132	32	200	3
		Foraging	256	127	350	25
Athene cunicularia	burrowing owl	Foraging and Nesting	132	32	200	3
		Foraging	256	127	350	25
Aythya americana	Redhead	Foraging	180	20	48	19
		Nesting	30	6	5	2
Buteo swainsoni	Swainson's hawk	Foraging	476	160	350	29
		Nesting	261	36	5	23
Charadrius montanus	mountain plover	Foraging	388	159	350	28
Circus cyaneus	northern	Foraging	274	133	350	25

Table 7-5.
Species Habitat Potentially Affected by Alternative A

Scientific Name	Common Name	Habitat Type	Maximum Impacted Area (acres)			
			Floodplain	Infrastructure	Borrow	Other
			(future habitat or agriculture)	(not future habitat)	(future habitat or agriculture)	
	harrier	Nesting	208	35	205	6
Elanus leucurus	white-tailed kite	Foraging	489	162	350	31
		Nesting	261	36	5	23
Grus canadensis canadensis	lesser sandhill crane	Foraging	464	162	350	31
Grus canadensis tabida	greater sandhill crane	Foraging	464	162	350	31
Lanius ludovicianus	loggerhead shrike	Foraging	370	154	350	28
		Foraging and Nesting	18	5	0	0
Numenius americanus	long-billed curlew	Foraging	388	159	350	28
Pelecanus erythrorhynchos	American white pelican	Foraging	210	26	53	21
Xanthocephalus xanthocephalus	yellow-headed blackbird	Foraging	370	154	350	28
		Nesting	94	9	5	3
Mammals						
Dipodomys nitratoides exilis	Fresno kangaroo rat	Habitat	4	13	0	0
Eumops perotis californicus	Western mastiff bat	Foraging	528	173	350	41
Lasiurus blossevillii	Western red bat	Roosting and Foraging	727	118	350	44
Taxidea taxus	American badger	Habitat	139	27	200	3

Notes:
Floodplain = floodplain of the San Joaquin River (passive restoration and agricultural activities)
Infrastructure = structures, levees, or roads
Borrow = maximum amount disturbed to take fill materials for levees (reseeded)
Other = construction staging areas, temporary access roads, and other construction-related disturbances (reseeded)

Impact WILD-1 (Alternative A): ***Project Effects on Special-Status Invertebrate Species.*** Compared to the No-Action Alternative, Alternative A could affect special-status invertebrate species, including valley elderberry longhorn beetle, due to construction-related activities and habitat modifications. Construction-related activities (including construction vehicle traffic, the temporary use of land for staging and access areas, noise, light, and vibration from construction activities, and other site-preparation activities such as grubbing, grading, tree removal, excavation, and driving off-road) in

suitable habitat for valley elderberry longhorn beetle could result in mortality, injury, or harassment of adults, eggs, and juveniles of special-status invertebrates.

Elderberry shrubs were mapped at a number of locations within the Alternative A footprint in the riparian corridor along the river channel and in elderberry savannah habitat (SJRRP 2011a). Levee construction, removal, and protection; floodplain grading; and the placement of other Project infrastructure (e.g., South Canal bifurcation structure) would result in long-term habitat conversion or modification, including damage or removal of valley elderberry host plants and modifications to riparian scrub and elderberry savannah habitats that may support the species. The majority of shrubs that are potentially affected are in future floodplain areas (i.e., up to 479 shrubs). These areas would be allowed to return to natural habitats after Project construction is complete, which would provide suitable habitat for elderberry shrubs after construction is complete, especially along the main river channel banks where many of the elderberry shrubs occur now. A smaller number of shrubs are in habitats that would be converted to Project infrastructure or levees (51 shrubs in riparian areas and 9 shrubs in non-riparian areas). Conservation Measures VELB-1 and VELB-2 include pre-construction surveys for elderberry shrubs and beetle exit holes, avoidance of elderberry shrubs found in the Project area, and compensatory mitigation for shrubs unavoidable during construction (Table 2-8).

Long-term effects of Alternative A include passive riparian habitat restoration in the floodplain. The continuation of Restoration Flows in the expanded floodplain would allow riparian vegetation to establish along previously bare banks of the San Joaquin River. This could have a beneficial effect on valley elderberry longhorn beetles, as increases in riparian vegetation would likely increase the number of elderberry shrubs, the beetle's host plant.

When comparing Alternative A to existing conditions, impacts to special-status invertebrate species would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Because implementation of Project conservation measures will compensate for potential impacts, and because the completed Project would provide habitat for elderberry shrubs, Project impacts are considered **less than significant**.

Impact WILD-2 (Alternative A): ***Project Effects on Special-Status Reptile Species.*** Compared to the No-Action Alternative, Alternative A could affect special-status reptile species (i.e., blunt-nosed leopard lizard, giant garter snake, western pond turtle, silvery legless lizard, San Joaquin coachwhip, and coast horned lizard) due to activities such as vehicle traffic, the temporary use of land for staging and access areas, noise, light, vibration, and other construction-related activities (e.g., grubbing, grading, tree removal, excavation, and driving off-road) that could alter reptile habitat and directly affect special-status reptile species. These direct effects on special-status reptiles could include mortality, injury, or harassment of adults, eggs, or juveniles as a result of construction activities in suitable habitat. Construction may also result in the destruction or degradation of habitat and the loss of nesting areas, burrows, or other refugia. Mortality, injury, or harassment may also occur if these species become trapped in open, excavated

areas. Construction activities could result in temporary shifts in foraging patterns or territories and increased predation as a result of increased noise, light, infrastructure, and ground vibrations where suitable habitat is present.

Indirect effects on reptiles may include the inadvertent introduction of non-native invasive (noxious) weeds, which can reduce habitat suitability (see Chapter 6.0, "Biological Resources – Vegetation"). However, Conservation Measure INV-1 includes measures to monitor, control, and where possible eradicate invasive plant infestations during construction activities (see Table 2-8). Soil compaction, cutting, and the placement of fill in suitable habitat may indirectly affect special-status reptiles by temporarily prohibiting burrowing, or by changing the frequency of vegetative cover. Construction activities may attract opportunistic predators (e.g., ravens, feral cats, and raccoons) that may feed on special-status reptiles.

Direct effects include the conversion of one habitat type to another or to Project infrastructure. This could result in the loss of individual special-status reptiles and their habitats within the limits of disturbance. However, much of the affected habitat within the floodplain would be allowed to return to natural habitat following Project construction disturbance, and these areas would continue to provide suitable habitat for special-status reptiles (Table 7-5). Some areas with habitat for special-status reptiles would be temporarily affected during construction for construction staging or construction access. Borrow areas that provide suitable habitat for special-status reptiles could be temporarily affected. Project infrastructure would result in a small amount of loss or modification of wetland (e.g., Mendota Pool Dike) and upland habitats that may support special-status reptile species.

Implementation of Alternative A would directly affect a small amount of habitat identified as potentially suitable for blunt-nosed leopard lizard (Table 7-5). A small portion of the area affected would become natural habitat again upon Project completion, and a larger portion would be converted to Project infrastructure or levees. Construction could result in destruction of rodent burrows used by lizards for shelter. DFW lists the blunt-nosed leopard lizard as a fully-protected species. Direct take (killing or injuring) of individual lizards is prohibited. To comply with this level of protection, Conservation Measures BNLL-1 includes focused site visits and habitat assessment in potentially suitable habitat, and if necessary, protocol-level surveys, in coordination with USFWS and DFW (Table 2-8). If blunt-nosed leopard lizard were detected, measures to avoid direct take would be implemented before ground disturbing activities. Conservation Measure BNLL-2 requires that compensation for impacts to habitat for the species would be determined in coordination with USFWS and DFW. These conservation measures are designed to avoid any direct take of blunt-nosed leopard lizards.

The primary habitat of one of 13 remnant populations of giant garter snake is Mendota Wildlife Area, roughly 3 miles south of the Project area and hydraulically connected to Mendota Pool via Fresno Slough (SJRRP 2011a). Implementation of Alternative A would directly affect open water, upland, and emergent wetland habitat potentially used by giant garter snake (Table 7-5). Most of the habitat affected would be left to passively return to natural habitat upon Project completion. Some of the habitat would be temporarily

affected by construction staging or access, and some of the habitat would be converted to Project infrastructure and levees. Although the exact location of the up to 350 acres of borrow has not been identified, potential borrow areas include some giant garter snake habitat; these areas would be avoided when feasible. Conservation Measure GGS-1 includes preconstruction surveys, avoidance of suitable giant garter snake habitat, restriction of ground disturbance in suitable habitat to the active season for giant garter snakes, and other measures to avoid and minimize harming giant garter snakes during construction (see Table 2-8). Conservation Measure GGS-2 includes restoration of giant garter snake habitat temporarily affected during construction.

Although construction may not directly affect certain areas of suitable habitat for giant garter snake, these areas may be indirectly affected by hydrologic changes in the San Joaquin River that would result from Project implementation. In the No-Action Alternative, much of the aquatic habitat in the Project area is maintained wet through much of the giant garter snake's summer active period by artificial impoundment of water behind Mendota Dam. The San Joaquin River arm of Mendota Pool extends to San Mateo Avenue in summer months, providing approximately 7 linear miles of slackwater habitat. Current management activities include drawing down Mendota Pool periodically during winter months and routing a portion of spring and early summer flood flows through Reach 2B; these management activities will continue under Alternative A. Although both of these activities could temporarily reduce prey base or habitat suitability for giant garter snake or western pond turtle, the margins of Mendota Pool areas near Mendota Dam and along the San Joaquin River arm are otherwise largely suitable for giant garter snake basking and foraging during most of their active period.

Project implementation would largely remove the San Joaquin arm of Mendota Pool. Alternative A would limit its extent to the Mendota Pool Dike; therefore, upstream aquatic conditions during the giant garter snake active period may vary over time and be a mix of slackwater, flowing water, and dry channel, which would likely be less suitable for giant garter snake than conditions currently found in Mendota Pool. Under Alternative A, the linear extent of the near-permanent slackwater habitat in the San Joaquin arm of Mendota Pool would be reduced to 0.6 mile. Although giant garter snakes would find suitable habitat in the Fresno Slough arm of Mendota Pool and may find some suitable habitat in the reconfigured river channel, compared to the No-Action Alternative, this would likely result in a reduction in potentially suitable habitat for giant garter snake. This could similarly affect western pond turtle, an aquatic turtle that is expected to prefer similar habitats in the Project area as giant garter snake. However, Conservation Measure GGS-2 includes compensation for the long-term loss of giant garter snake habitat at a ratio and in a manner determined through consultation with USFWS and DFW including specific measures such as the restoration and creation of suitable habitat (Table 2-8).

Long-term effects of Alternative A include passive restoration in the expanded floodplain. Floodplain habitat would include floodplain benches and floodplain channels inundated under high flow conditions (i.e., high flow channels) which would have lower velocities than the main channel (see Figure 2-3). This could provide some suitable habitat for giant garter snakes, western pond turtles, and their prey near the main channel of the river. Changes in flow regime that affect water temperature and velocity are not

expected to affect the other special-status reptile species (blunt-nosed leopard lizard, silvery legless lizard, San Joaquin coachwhip, and coast horned lizard). However, these special-status reptiles could benefit from the conversion of agricultural lands to restored natural habitat.

When comparing Alternative A to existing conditions, impacts to special-status reptile species would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Temporary impacts during construction activities would vary spatially and occur intermittently within the overall construction timeframe for the entire Project, and most of the habitat for special-status reptiles affected would either be restored or remain as natural habitats at Project completion. Implementation of conservation measures would control or eradicate non-native invasive plants, which can negatively impact special-status reptiles. Conservation measures to avoid and minimize impacts, and/or to compensate for impacts, have been incorporated into the Project for blunt-nosed leopard lizard and giant garter snake. Avoidance, minimization, and compensation measures incorporated into the Project for giant garter snake would also benefit western pond turtle. Therefore, impacts to special-status reptile species are considered **less than significant**.

Impact WILD-3 (Alternative A): ***Project Effects on Special-Status Bird Species.*** Compared to the No-Action Alternative, Alternative A could affect special-status bird species (i.e., Swainson's hawk, white-tailed kite, greater sandhill crane, tricolored blackbird, greater white-fronted goose, short–eared owl, burrowing owl, redhead, mountain plover, northern harrier, lesser sandhill crane, loggerhead shrike, long-billed curlew, American white pelican, and yellow-headed blackbird) due to construction-related activities and habitat modifications. Direct effects of construction-related activities to special-status bird species include the potential mortality, injury or harassment of adults, juveniles, and nests due to construction vehicle traffic; the temporary use of land for staging and access areas; noise, light, and vibration from construction activities; and other site-preparation activities (i.e., grubbing, grading, tree removal, excavation, and driving off-road). Levee construction, removal, and protection, floodplain grading, and the placement of other Project infrastructure (i.e., South Canal bifurcation structure) would result in long-term conversion or modification of habitat that may support special-status bird species after construction is complete.

Almost all native bird species are protected broadly under the Migratory Bird Treaty Act. To avoid and minimize adverse effects to native birds, Conservation Measure MBTA-1 (Table 2-8) will restrict some Project activities to the non-breeding season. Conservation Measure MBTA-1 will also establish an Avian Protection Plan to further minimize and/or avoid adverse effects to native bird species. Direct effects on breeding raptor species would be avoided or minimized by implementation of Conservation Measures RAPTOR-1 and RAPTOR-2 (Table 2-8). These measures would restrict some construction activities to the non-breeding season to protect nests. If nests are found, a no-disturbance buffer would be established until birds have fledged. If any native trees suitable for raptor nesting are removed during Project activities, they would be replaced. Effects to riparian nesting birds would be avoided or minimized by Conservation Measure RNB-1 and

RNB-2. These measures require preconstruction surveys when riparian nesting birds are anticipated in the Project area, and construction avoidance and minimization measures.

Indirect effects of construction activities on birds may include creation of conditions in active work areas that attract opportunistic predators such as raccoons and domestic cats. Changes to vegetation type and structure, including the introduction of non-native invasive plant species, may decrease habitat suitability for foraging, nesting, or cover. Conservation Measure INV-1 (Table 2-8) would lessen the effects of invasive plant species by controlling and eradicating invasive plants where possible.

Implementation of Alternative A is likely to result in a combination of adverse effects as a result of construction, followed by long-term beneficial effects to special-status bird species. The placement of structures and levees would affect only a small proportion of habitat within the Project footprint (Table 7-5). Areas used for construction staging or access would be revegetated or returned to pre-project conditions; borrow areas would be disturbed during construction and revegetated at lower elevations (see Section 2.2.4). The analysis of effects to habitat for special-status bird species is based on species' association with specific habitats, but many of these species are capable of occurring across a variety of habitat types.

Implementation of Alternative A would affect habitat suitable for Swainson's hawk foraging and nesting (Table 7-5). To reduce the adverse effects of construction to Swainson's hawks, Conservation Measure SWH-1 requires preconstruction surveys for nesting Swainson's hawks. If nests are found, a no-disturbance buffer would be established until the nest is inactive. Most of the areas affected by Project activities would be passively returned to natural habitat, but a smaller portion would be converted to Project infrastructure or levees. Removal of foraging habitat or nesting trees will be compensated by establishing habitat suitable for foraging and nesting trees suitable for Swainson's hawks (Conservation Measure SWH-2, Table 2-8).

Burrowing owls require special consideration as, unlike other bird species addressed in this document, they live in underground burrows, making them particularly susceptible to ground disturbance, digging, and excavating. To protect burrowing owls and minimize effects, Conservation Measures BRO-1 and BRO-2 will be implemented (Table 2-8). These measures would decrease potential for adverse effects by avoiding work around active burrows. No-disturbance zones would be established around occupied burrows. Burrowing owls in the Project area would be passively relocated if they are not breeding. If occupied burrows are destroyed during construction, burrows outside of the active Project area would be enhanced or created to provide habitat for these birds.

Long-term effects of Alternative A include passive riparian habitat restoration in the floodplain. The continuation of Restoration Flows in the expanded floodplain would allow riparian vegetation to establish along previously bare banks of the San Joaquin River. This would provide greater foraging and/or nesting habitat for Swainson's hawks, white-tailed kites, and short-eared owls.

When comparing Alternative A to existing conditions, impacts to special-status bird species would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Implementation of Alternative A should eventually result in a long-term net increase in the type and diversity of aquatic and riparian microhabitats associated with the river system. Project construction would require significant modifications to the existing levees, which would result in the loss of riparian nesting and foraging habitat. These impacts would be mostly temporary, and most of the habitat suitable for special-status birds would be allowed to return to riparian floodplain habitats or restored at Project completion. Avoidance, minimization, and conservation measures incorporated into the Project are broadly protective, reducing impacts to nesting activity for essentially all native birds. Additional measures would reduce impacts to raptors, with special attention to Swainson's hawk and burrowing owl. Loss of Swainson's hawk nesting and foraging habitat would be compensated. With the inclusion of these conservation measures, project impacts to special-status bird species are considered **less than significant.**

Impact WILD-4 (Alternative A): ***Project Effects on Special-Status Mammal Species.*** Compared to the No-Action Alternative, Alternative A could affect special-status mammal species (Fresno kangaroo rat, western mastiff bat, western red bat, and American badger) due to construction-related activities and habitat modifications. Construction-related activities, including construction vehicle traffic; temporary use of land for staging and access areas; noise, light, and vibration from construction activities; and other site-preparation activities (i.e., grubbing, grading, tree removal, excavation, and driving off-road) in suitable habitat for special-status mammals could result in mortality, injury, or harassment of special-status mammal species. Levee construction, removal, and protection, and the placement of other Project infrastructure (i.e., South Canal bifurcation structure) would result in long-term habitat conversion or modification of habitats that may support these mammal species after construction is complete.

Construction activities may attract opportunistic predators that may prey on special-status mammals. Lighted construction areas could disorient species and disrupt nocturnal foraging activities. Ground disturbance could lead to the temporary loss of foraging and burrowing habitat. Most of the adverse effects associated with construction are considered temporary. For most of the special-status mammal species, much of the affected habitat would be passively returned to natural conditions following Project construction (Table 7-5). Borrow areas, staging areas and temporary access roads would be stabilized (e.g., revegetated) or returned to pre-project conditions and function as habitat following implementation of Alternative A.

Potential construction effects on western red bats and western mastiff bats would be a temporary loss or change of foraging and roosting habitat from disturbance. In order to minimize effects to special-status bats, avoidance and minimization measures are incorporated into the Project (Table 2-8). Conservation Measure BAT-1 includes surveys for locating bat roosts prior to construction activities and excluding bats from active work zones during appropriate seasons. Any roosts removed or damaged during construction will be replaced with agency-approved and suitable bat boxes (Conservation Measure BAT-2).

Potential Fresno kangaroo rat habitat quality and quantity would diminish with implementation of Alternative A due to construction activities, though the amount of potential habitat that would be affected by Project activities is small (Table 7-5). Three areas with potentially suitable habitat on the eastern end of Reach 2B of the San Joaquin River were surveyed for Fresno kangaroo rat and none were detected (SJRRP 2011a). Access for surveys was not available in all areas of potentially suitable habitat on the south side of the river and there is a low to moderate potential for the species to occur there. If present, indirect effects on Fresno kangaroo rat from temporary habitat conversion could include shifts in foraging patterns or territories, increased predation, and decreased reproductive success. Alteration and compaction of soils would render portions of the potentially suitable habitat less suitable for Fresno kangaroo rat burrowing. To minimize the potential adverse effects of construction, preconstruction transect surveys would be conducted to locate potential burrows for Fresno kangaroo rats. If burrows are found within 100 feet of the Project footprint, focused live trapping surveys would be conducted by qualified biologists using approved methodologies. If necessary, additional conservation may be developed with USFWS and DFW. Construction activities in potential habitat would be timed to occur during the non-breeding season (FKR-1, Table 2-8).[3] Implementation of Conservation Measure FKR-3 will compensate for any temporary or long-term loss of habitat or take of individuals.

Although there is a low potential for San Joaquin kit fox to occur in the Project area, Conservation Measure SJKF-1 will be implemented to identify potential dens, avoid occupied dens near construction areas, and if dens are located within the proposed work area, time construction activities to avoid the normal breeding season.

Long-term effects of Alternative A include passive riparian habitat restoration in the floodplain. The continuation of Restoration Flows in the expanded floodplain would allow riparian vegetation to establish along previously bare banks of the San Joaquin River. This would provide greater foraging and roosting habitat for western red bats and more foraging habitat for western mastiff bats.

When comparing Alternative A to existing conditions, impacts to special-status mammals would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Most of the project impacts would be limited to the duration of construction. Construction impacts would be temporary and would occur intermittently at discrete locations within the overall construction timeframe for the entire Project. Post-project conditions would passively return to natural habitats in much of the disturbed areas. Conservation measures that will be implemented for Alternative A are designed to minimize and avoid adverse impacts to special-status mammal species. With the inclusion of these measures, impacts of Alternative A to special-status mammals are considered **less than significant**.

Impact WILD-5 (Alternative A): ***Project Effects on Wildlife Movement Corridors.*** Compared to the No-Action Alternative, Alternative A could affect wildlife movement

[3] FKR-2 avoids disturbance to designated critical habitat for the species; there is no critical habitat for Fresno kangaroo rats within Reach 2B.

along migration corridors. Wildlife movement refers to localized, small distance movements made by animals within a home range; seasonal shifts for the purposes of locating food and water or breeding territory; larger dispersal movement of an individual between suitable habitats; and true trans-continental migrations. Many species, including most invertebrates, reptiles, and small mammals, are restricted to smaller distance migrations. A number of bird species (including Swainson's hawk, greater sandhill crane, greater white-fronted goose, redhead, mountain plover, northern harrier, lesser sandhill crane, loggerhead shrike, long-billed curlew, and American white pelican) make longer, seasonal migrations.

Construction activities such as vehicle traffic, the temporary use of land for staging and access areas, noise, light, vibration, and any other construction-related activities (e.g., grubbing, grading, tree removal, excavation, and driving off-road) may deter animals from using the area during migration. Construction may also result in the temporary destruction or degradation of habitat and the temporary loss of vegetated movement corridors. Direct mortality, injury, or harassment may also occur to species using the area for dispersal or migration. Construction activities may attract opportunistic predators (e.g., ravens, feral cats, and raccoons) that may feed on migrating species. Long-term construction effects include the conversion of small portions of a migration corridor to Project-related infrastructure, but also an overall expansion of habitat suitable for wildlife movement upon Project completion.

Only discrete subsections of the Project area would be under construction at any given time during the overall construction period, thereby reducing the severity of adverse effects associated with the creation of movement barriers. Wildlife would be able to move unobstructed through most of the Project area, particularly at night, throughout the duration of Project activities. In-channel construction activities will be limited to daylight hours during weekdays, leaving a nighttime and weekend periods available for wildlife movement along the river corridor (Conservation Measure EFH-2). Disturbance of riparian vegetation will also be avoided to the greatest extent practicable, as required by Conservation Measure EFH-1. Implementing Conservation Measure RHSNC-1 (Table 2-8) would minimize and avoid losses of riparian habitat. Implementing RHSNC-2 would compensate for any losses of riparian habitat or other sensitive natural communities.

Long-term effects of Alternative A include passive riparian habitat restoration in the floodplain. The continuation of Restoration Flows in the expanded floodplain would allow riparian vegetation to establish along previously bare banks of the San Joaquin River. This would provide cover and forage for animals moving along the river course. It would also provide more habitat for migratory bird species that may use the area as a stopping point for seasonal migrations. Post-project conditions would generally facilitate movement and provide habitat for many special-status species, including valley elderberry longhorn beetle, Swainson's hawk, white-tailed kite, tricolored blackbird, yellow-headed blackbird, and western red bat.

When comparing Alternative A to existing conditions, impacts to movement corridors would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Most of these impacts would be temporary

and would occur intermittently within the overall construction timeframe for the entire Project. Most of the Project impacts would be limited to the duration of construction. Post-project conditions would return natural habitats to much of the disturbed areas and are expected to increase riparian vegetation, potentially improving conditions for migratory species. Impacts of Alternative A to movement corridors are considered **less than significant.**

Impact WILD-6 (Alternative A): ***Long-term Habitat Improvement in Reach 2B.*** Compared to the No-Action Alternative, Restoration Flows in Reach 2B would be conveyed through an expanded floodplain. Over time wetland communities would develop within the main channel and a dense riparian scrubland would develop along the main river channel banks. The Restoration Flows would be used to recruit new vegetation along the channel from the existing seed bank. Between the main river channel banks and the proposed levees, agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) would occur.

Passive riparian habitat restoration of the San Joaquin River would improve native floodplain and in-channel habitats, which would likely benefit native and potentially special-status species such as Swainson's hawk (*Buteo swainsoni*) and greater sandhill crane (*Grus canadensis tabida*). Benefits to native species would be realized through the re-introduction of perennial base flows as well as seasonal high flows in the river, which in turn would promote the establishment of riparian vegetation. Well-established native plant communities in the floodplain would support rich and diverse native flora, potentially including special-status plant species, and would provide foraging habitat and shelter for native wildlife species.

Alternative A supports the following wildlife habitat improvements:

- Restoring river-floodplain connectivity and longitudinal connectivity of riparian vegetation near the channel (without major breaks in the distribution of woody vegetation except where natural conditions prevent establishment of native trees or shrubs) that can provide cover and habitat for a variety of wildlife species.
- Creating or maintaining a combination of diverse habitats required by select wildlife species, such as species that depend on occurrence of aquatic, wetland or riparian, and upland habitats to meet various life stage requirements (e.g., western pond turtle, Swainson's hawk).
- Enhancing landscape connectivity between the river corridor and adjacent areas of ecological significance (e.g., wildlife refuges and other protected lands, biodiversity "hotspots," adjacent sloughs or tributary channels with existing riparian habitat, wildlife movement corridors, and natural preserves such as the Mendota Wildlife Area).

When comparing Alternative A to existing conditions, effects on long-term opportunities for habitat improvement in Reach 2B would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). According to habitat restoration estimates, Alternative A could provide up

to 1,330 acres of wildlife habitat and up to 1,070 acres of special-status species habitat (areas not mutually exclusive) (SJRRP 2012, Attachment A). For many of these habitat types, this represents a 2- to 5-fold increase in habitat as compared to existing conditions. In general, implementation of Alternative A would cause a **beneficial** effect on wildlife habitat.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B would include construction of Project features including a Compact Bypass channel, a new levee system with a wide, consensus-based floodplain encompassing the river channel, and the Compact Bypass Bifurcation Structure with fish passage facility. Other key features include construction of a fish passage facility at the San Joaquin River control structure of Chowchilla Bifurcation Structure, the re-route of Drive 10 ½ (across the Compact Bypass bifurcation structure), and removal of the San Mateo Avenue crossing. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

This alternative includes a mixture of active and passive riparian and floodplain habitat restoration and compatible agricultural activities in the floodplain. It is assumed that wetland communities and a dense riparian scrubland would develop along the main channel and river banks, respectively, and bands of other habitat types (wetland, scrub, grassland, and forest) would develop at higher elevations along the channel corridor. Plantings that are wetland species or borderline wetland species would be irrigated and managed as necessary during the establishment period.

Table 7-6 summarizes maximum habitat impacts by acreage for all vertebrate species with the potential to occur in the Project area. These acreages represent the worst-case scenario where all existing floodplain areas are assumed to be impacted.

Table 7-6.
Species Habitat Potentially Affected by Alternative B

Scientific Name	Common Name	Habitat Type	Maximum Impacted Area (acres)			
			Floodplain	Infrastructure	Borrow	Other
			(future habitat)	(not future habitat)	(future habitat or agriculture)	
Reptiles						
Actinemys marmorata	western pond turtle	Upland	170	14	47	2
		Aquatic	114	9	44	8
		Wetland	17	1	3	2
Anniella pulchra pulchra	silvery legless lizard	Habitat	414	53	206	9
Gambelia sila	blunt-nosed leopard lizard	Habitat	5	7	<0.5	<0.3
Masticophis flagellum ruddocki	San Joaquin coachwhip	Habitat	140	15	200	5

Table 7-6.
Species Habitat Potentially Affected by Alternative B

Scientific Name	Common Name	Habitat Type	Maximum Impacted Area (acres)			
			Floodplain	Infrastructure	Borrow	Other
			(future habitat)	(not future habitat)	(future habitat or agriculture)	
Phrynosoma blainvillii	coast horned lizard	Habitat	219	27	202	6
Thamnophis gigas	giant garter snake	Upland	170	14	47	2
		Aquatic	114	9	44	8
		Wetland	17	1	3	2
Birds						
Agelaius tricolor	tricolored blackbird	Foraging	389	51	350	10
		Nesting	120	13	38	3
Anser albifrons elgasi	greater white-fronted goose	Foraging	217	12	48	11
Asio flammeus	short-eared owl	Foraging and Nesting	135	16	200	5
		Foraging	301	46	350	5
Athene cunicularia	burrowing owl	Foraging and Nesting	135	16	200	5
		Foraging	301	46	350	5
Aythya americana	redhead	Foraging	187	10	44	9
		Nesting	30	2	4	2
Buteo swainsoni	Swainson's hawk	Foraging	523	62	350	11
		Nesting	274	38	6	4
Charadrius montanus	mountain plover	Foraging	435	62	350	10
Circus cyaneus	northern harrier	Foraging	321	48	350	5
		Nesting	208	18	204	8
Elanus leucurus	white-tailed kite	Foraging	534	65	350	13
		Nesting	274	38	6	4
Grus canadensis canadensis	lesser sandhill crane	Foraging	509	65	350	13
Grus canadensis tabida	greater sandhill crane	Foraging	509	65	350	13
Lanius ludovicianus	loggerhead shrike	Foraging	416	61	350	10
		Foraging and Nesting	20	1	<0.5	<0.2
Numenius americanus	long-billed curlew	Foraging	435	62	350	10
Pelecanus erythrorhynchos	American white pelican	Foraging	217	12	48	11
Xanthocephalus xanthocephalus	yellow-headed blackbird	Foraging	416	61	350	10
		Nesting	93	3	4	3

Table 7-6.
Species Habitat Potentially Affected by Alternative B

Scientific Name	Common Name	Habitat Type	Maximum Impacted Area (acres)			
			Floodplain (future habitat)	Infrastructure (not future habitat)	Borrow (future habitat or agriculture)	Other (future habitat or agriculture)
Mammals						
Dipodomys nitratoides exilis	Fresno kangaroo rat	Habitat	5	7	0	0
Eumops perotis californicus	Western mastiff bat	Foraging	585	85	350	14
Lasiurus blossevillii	Western red bat	Roosting and Foraging	829	116	350	24
Taxidea taxus	American badger	Habitat	140	15	200	5

Notes:
Floodplain = floodplain of the San Joaquin River (mixture of active and passive restoration and agricultural activities)
Infrastructure = structures, levees, or roads
Borrow = maximum amount disturbed to take fill materials for levees (reseeded)
Other = construction staging areas, temporary access roads, and other construction-related disturbances (reseeded)

Impact WILD-1 (Alternative B): ***Project Effects on Special-Status Invertebrate Species.*** Compared to the No-Action Alternative, Alternative B could affect special-status invertebrates. Construction-related effects on special-status invertebrate species would generally be the same as those described for Alternative A (see Impact WILD-1 [Alternative A]), with several exceptions.

Unlike Alternative A, Alternative B would use the Compact Bypass Bifurcation Structure to convey water from the San Joaquin River to Mendota Pool (and excludes the South Canal and associated levees). These infrastructure differences would result in effects on fewer elderberry shrubs, in comparison to Alternative A (i.e., one shrub in a riparian area and three shrubs in non-riparian areas). Up to 537 additional shrubs located in the future floodplain area are potentially affected. Conservation Measures VELB-1 and VELB-2 include pre-construction surveys for elderberry shrubs and beetle exit holes, avoidance of elderberry shrubs found in the Project area, and compensatory mitigation for shrubs unavoidable during construction (Table 2-8). Portions of the future floodplain areas would be allowed to return to natural habitats after Project construction is complete, which would provide suitable habitat for elderberry shrubs after construction is complete, especially along the main river channel banks where many of the elderberry shrubs occur now. Alternative B also features a wide, consensus-based floodplain and a mixture of active and passive restoration and floodplain compatible agricultural activities. These features would result in more riparian habitat over the long-term and presumably more valley elderberry longhorn beetle habitat than Alternative A.

Construction activity under Alternative B is expected to take 157 months; therefore, adverse effects of construction would occur over an approximately 2 years longer period as compared to Alternative A.

When comparing Alternative B to existing conditions, impacts to special-status invertebrates would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative B to the No-Action Alternative). Because these impacts would be temporary and would occur intermittently within the overall construction timeframe, and because conservation measures are in place to reduce, minimize, and compensate for impacts, they are considered **less than significant**.

Impact WILD-2 (Alternative B): ***Project Effects on Special-Status Reptile Species.*** Compared to the No-Action Alternative, Alternative B could affect special-status reptile species. Construction-related effects on special-status reptile species would generally be the same as those described for Alternative A (see Impact WILD-2 [Alternative A]), with several exceptions.

Unlike Alternative A, Alternative B would create a wide, consensus-based floodplain. This change would result in adverse effects on slightly less habitat for most special-status reptiles compared to Alternative A (see Table 7-6). Alternative B would affect nearly the same amount of potential habitat for blunt-nosed leopard lizard as Alternative A, but a smaller portion of the habitat affected would be converted to Project infrastructure than under Alternative A, potentially resulting in a smaller long-term effect on this species (if present). All adverse effects would be avoided and/or mitigated with implementation of the Conservation Measures BNLL-1 and BNLL-2 (Table 2-8). As a fully-protected species, direct take of blunt-nosed leopard lizards would be prohibited.

Alternative B would affect slightly less potential habitat for giant garter snake than Alternative A, and more of the potential habitat affected under Alternative B would remain as or be restored to natural habitats upon Project completion, resulting in a potentially reduced long-term effect on this species in comparison to Alternative A. Similar to Alternative A, measures would be implemented to minimize these adverse effects to special-status reptiles (see Impact WILD-2 [Alternative A] and Table 2-8).

The Mendota Pool control structure of the Compact Bypass Bifurcation Structure (Alternative B) would be in the same location as the Mendota Pool Dike (Alternative A). Therefore, both of these alternatives would provide equivalent amounts of slackwater habitat for giant garter snake in the San Joaquin River arm of Mendota Pool (see Impact WILD-2 [Alternative A]) following Project completion.

When comparing Alternative B to existing conditions, impacts to special-status reptiles would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative B to the No-Action Alternative). Because these impacts would occur intermittently within the overall construction timeframe, and conservation measures are in place to reduce, minimize, and compensate for impacts, they are considered **less than significant**.

Impact WILD-3 (Alternative B): ***Project Effects on Special-Status Bird Species.*** Compared to the No-Action Alternative, Alternative B could affect special-status bird species. Construction-related effects on special-status bird species would generally be the same as those described for Alternative A (see Impact WILD-3 [Alternative A]), with several exceptions.

Unlike Alternative A, Alternative B would create a wide, consensus-based floodplain. This change would result in adverse effects on slightly more habitat for most special-status birds than Alternative A (see Table 7-6). However, most of this habitat would remain as or be restored to native habitats upon Project completion. Similar to Alternative A, measures would be implemented to minimize adverse effects to special-status birds (see Impact WILD-3 [Alternative A] and Table 2-8).

The wide floodplain featured in Alternative B may provide more foraging and/or nesting habitat (compared to the narrow floodplain) for a number of species, including the Northern harrier, greater sandhill crane, Swainson's hawk, long-billed curlew, and short-eared owl, compared to both Alternative A and the No-Action Alternative. Under Alternative B, the floodplain and associated riparian habitat would include active restoration areas, whereas under Alternative A, passive restoration would depend on the availability of the existing seed bank and seed sources. Following construction of Alternative B Project components, wetland, floodplain, and riparian areas in the active restoration portion would be planted and irrigated until vegetation was established (see Chapter 2.0, "Description of Alternatives"). This could result in more rapid development of riparian habitat important to birds following construction.

When comparing Alternative B to existing conditions, impacts to special-status birds would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative B to the No-Action Alternative). Because the majority of these impacts would be temporary and would occur intermittently within the overall construction timeframe, because conservation measures are in place to reduce and minimize impacts, and because active restoration of riparian habitats would occur, they are considered **less than significant**.

Impact WILD-4 (Alternative B): ***Project Effects on Special-Status Mammal Species.*** Compared to the No-Action Alternative, Alternative B could affect special-status mammal species. Construction-related effects on special-status mammal species would generally be the same as those described for Alternative A (see Impact WILD-4 [Alternative A]), with several exceptions.

Unlike Alternative A, Alternative B would create a wide, consensus-based floodplain. The wide floodplain would generally affect more habitat for special-status mammals during construction, including areas near the river and at temporary staging areas, than Alternative A (see Table 7-6). However, most of this habitat would remain unchanged or be restored to natural habitats upon Project completion and less habitat would be converted to Project infrastructure. Similar to Alternative A, measures would be implemented to minimize these adverse effects to special-status mammals (see Impact WILD-4 [Alternative A] and Table 2-8). Following Project completion under Alternative

B, fewer acres of potential habitat for special-status mammals would be converted to infrastructure, as compared to Alternative A.

The wide floodplain featured in Alternative B may provide more foraging habitat (compared to the narrow floodplain in Alternative A or the No-Action Alternative) for bat species. Under this alternative, portions of the floodplain and associated riparian habitat would be actively restored. Following construction of Alternative B Project components, wetland, floodplain, and riparian areas in the active restoration portion would be planted and irrigated until vegetation is established (see Chapter 2.0, "Description of Alternatives").

When comparing Alternative B to existing conditions, impacts to special-status mammals would generally be the same as described in the preceding paragraphs (i.e., the comparison of Alternative B to the No-Action Alternative). Because impacts would be temporary and would occur intermittently within the overall construction timeframe, conservation measures are in place to reduce and minimize impacts, and active restoration of riparian habitats would occur, the impacts are considered **less than significant**.

Impact WILD-5 (Alternative B): ***Adverse Effects on Wildlife Movement Corridors.*** Compared to the No-Action Alternative, Alternative B could affect wildlife movement along migration corridors. Construction-related effects on migration corridors would generally be the same as those described for Alternative A (see Impact WILD-5 [Alternative A]), with several exceptions.

Unlike Alternative A, Alternative B would create a wide, consensus-based floodplain, which would provide a larger riparian corridor for movement. Project construction periods would be longer than Alternative A, but post-project conditions would most likely improve habitat for migrating species, especially because portions of the floodplain would be actively restored for Alternative B.

When comparing Alternative B to existing conditions, impacts to movement corridors would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative B to the No-Action Alternative). Most of these impacts would be temporary and would occur intermittently within the overall construction timeframe for the entire Project. Post-project conditions would return natural habitats to much of the disturbed areas and are expected to increase riparian vegetation, potentially improving conditions for migratory species. Impacts of Alternative B to movement corridors are considered **less than significant.**

Impact WILD-6 (Alternative B): ***Long-term Habitat Improvement in Reach 2B.*** Compared to the No-Action Alternative, Restoration Flows in Reach 2B would be conveyed through an expanded floodplain. Wetland communities would develop within the main channel, a dense riparian scrubland would develop along the main river channel banks, and bands of other habitat types (wetland, scrub, grassland, and forest) would develop at higher elevations along the channel corridor. The wetland, floodplain, and

riparian areas in the active restoration portion would be planted following construction and then irrigated and managed as necessary during the establishment period.

Active riparian and floodplain habitat restoration would improve native floodplain and in-channel habitats, which would likely benefit native and potentially special-status species. Benefits to native species would be realized through the re-introduction of perennial base flows as well as seasonal high flows in the river, which in turn would promote the establishment of riparian vegetation. Well-established native plant communities in the floodplain would support rich and diverse native flora, potentially including special-status plant species, and would provide foraging habitat and shelter for native wildlife species.

When comparing Alternative B to existing conditions, effects on long-term opportunities for habitat improvement in Reach 2B would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative B to the No-Action Alternative). According to habitat restoration estimates, Alternative B could provide up to 1,870 acres of wildlife habitat and up to 1,640 acres of special-status species habitat (not mutually exclusive areas) (SJRRP 2012, Attachment A). For many of these habitat types, this represents a 3- to 9-fold increase in habitat as compared to existing conditions. In general, implementation of Alternative B would cause a **beneficial** effect on wildlife habitat.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C would include construction of Project features including Fresno Slough Dam, a new levee system with a narrow floodplain encompassing the river channel, and the Short Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the Short Canal control structure and fish screen, the Chowchilla Bifurcation Structure fish passage facility, modification of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Similar to Alternative B, Alternative C includes active riparian and floodplain habitat restoration. It is assumed that wetland communities and a dense riparian scrubland would develop along the main channel and river banks, respectively, and bands of other habitat types (wetland, scrub, grassland, and forest) would develop at higher elevations along the channel corridor. The wetland, floodplain, and riparian areas would be planted following construction and then irrigated and managed as necessary during the establishment period.

Table 7-7 summarizes habitat impacts by acreage for all vertebrate species. These acreages represent the worst-case scenario where all existing floodplain areas are assumed to be impacted.

Table 7-7.
Species Habitat Potentially Affected by Alternative C

Scientific Name	Common Name	Habitat Type	Maximum Impacted Area (acres)			
			Floodplain (future habitat)	Infrastructure (not future habitat)	Borrow (future habitat or agriculture)	Other (future habitat or agriculture)
Reptiles						
Actinemys marmorata	western pond turtle	Upland	172	20	45	7
		Aquatic	146	17	41	25
		Wetland	29	7	3	7
Anniella pulchra pulchra	silvery legless lizard	Habitat	445	46	214	36
Gambelia sila	blunt-nosed leopard lizard	Habitat	6	9	0	0
Masticophis flagellum ruddocki	San Joaquin coachwhip	Habitat	158	14	200	11
Phrynosoma blainvillii	coast horned lizard	Habitat	238	26	202	15
Thamnophis gigas	giant garter snake	Upland	172	20	45	7
		Aquatic	146	17	41	25
		Wetland	29	7	3	7
Birds						
Agelaius tricolor	tricolored blackbird	Foraging	312	45	350	55
		Nesting	117	16	52	21
Anser albifrons elgasi	greater white-fronted goose	Foraging	262	27	45	33
Asio flammeus	short-eared owl	Foraging and Nesting	153	18	200	11
		Foraging	190	37	350	57
Athene cunicularia	burrowing owl	Foraging and Nesting	153	18	200	11
		Foraging	190	37	350	57
Aythya americana	redhead	Foraging	220	18	41	26
		Nesting	42	9	3	7
Buteo swainsoni	Swainson's hawk	Foraging	430	55	350	60
		Nesting	287	32	14	24
Charadrius montanus	mountain plover	Foraging	342	55	350	68
Circus cyaneus	northern harrier	Foraging	209	41	350	57
		Nesting	239	24	204	19
Elanus leucurus	white-tailed kite	Foraging	453	61	350	76
		Nesting	287	32	14	24
Grus canadensis canadensis	lesser sandhill crane	Foraging	429	61	350	76
Grus canadensis tabida	greater sandhill crane	Foraging	429	61	350	76
Lanius	loggerhead	Foraging	323	51	350	68

Table 7-7.
Species Habitat Potentially Affected by Alternative C

Scientific Name	Common Name	Habitat Type	Maximum Impacted Area (acres)			
			Floodplain (future habitat)	Infrastructure (not future habitat)	Borrow (future habitat or agriculture)	Other (future habitat or agriculture)
ludovicianus	shrike	Foraging and Nesting	20	4	0	0
Numenius americanus	long-billed curlew	Foraging	342	55	350	68
Pelecanus erythrorhynchos	American white pelican	Foraging	262	27	45	33
Xanthocephalus xanthocephalus	yellow-headed blackbird	Foraging	323	51	350	68
		Nesting	106	9	4	7
Mammals						
Dipodomys nitratoides exilis	Fresno kangaroo rat	Habitat	6	9	0	0
Eumops perotis californicus	Western mastiff bat	Foraging	524	70	350	72
Lasiurus blossevillii	Western red bat	Roosting and Foraging	754	110	350	48
Taxidea taxus	American badger	Habitat	158	14	200	11

Notes:
Floodplain = floodplain of the San Joaquin River (active restoration)
Infrastructure = structures, levees, or roads
Borrow = maximum amount disturbed to take fill materials for levees (reseeded)
Other = construction staging areas, temporary access roads, and other construction-related disturbances (reseeded)

Impact WILD-1 (Alternative C): ***Project Effects on Special-Status Invertebrate Species.*** Compared to the No-Action Alternative, Alternative C could affect special-status invertebrate species. Construction-related effects on special-status invertebrate species would generally be the same as those described for Alternative A (see Impact WILD-1 [Alternative A]), with several exceptions.

Unlike Alternative A, Alternative C would use the river channel for Restoration Flow and the Short Canal to convey water from the San Joaquin River to Mendota Pool (and excludes the South Canal and associated levees). These infrastructure differences would result in effects on fewer elderberry shrubs, in comparison to Alternative A (i.e., one shrub in riparian areas and three shrubs in non-riparian areas). Up to 537 additional shrubs located in the future floodplain area are potentially affected. Conservation Measures VELB-1 and VELB-2 include pre-construction surveys for elderberry shrubs and beetle exit holes, avoidance of elderberry shrubs found in the Project area, and compensatory mitigation for shrubs unavoidable during construction (Table 2-8). Future floodplain areas would be allowed to return to natural habitats after Project construction is complete, which would provide suitable habitat for elderberry shrubs after construction is complete, especially along the main river channel banks where many of the elderberry

shrubs occur now. Though both Alternatives A and C include plans for a narrow floodplain, Alternative C features active riparian and floodplain restoration and would not include agricultural or grazing use within the floodplain. Implementation of Alternative C would result in more riparian habitat over the long-term and potentially more valley elderberry longhorn beetle habitat than Alternative A.

Construction activity under Alternative C is expected to take 133 months, which is a similar duration as Alternative A.

When comparing Alternative C to existing conditions, impacts to special-status invertebrate species would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative C to the No-Action Alternative). Because unavoidable impacts would be compensated for through implementation of the Project conservation measures and because the completed Project would provide habitat for elderberry shrubs, the impacts are considered **less than significant**.

Impact WILD-2 (Alternative C): ***Project Effects on Special-Status Reptile Species.*** Compared to the No-Action Alternative, Alternative C could affect some special-status reptile species. Construction-related effects on special-status reptile species would generally be the same as those described for Alternative A (see Impact WILD-1 [Alternative A]), with several exceptions.

Unlike Alternative A, Alternative C would include the construction of the Fresno Slough Dam and the Short Canal. This change would result in adverse effects to slightly more habitats for special-status reptiles in areas near the river, compared to Alternative A (see Table 7-7). Under Alternative C, less habitat area would be converted to Project infrastructure for most special-status reptile species, with the exception of the aquatic and wetland habitats for the giant garter snake and the western pond turtle. Alternative C would use the river channel to convey Restoration Flows through Reach 2B (instead of a Compact Bypass). This method essentially removes the slackwater habitat for giant garter snake in the San Joaquin arm of Mendota Pool following Project completion. Whereas, Alternative A would retain a small portion of slackwater habitat between the Mendota Dam and the Mendota Pool Dike (see Impact WILD-2 [Alternative A]). Similar to Alternative A, measures would be implemented to minimize these adverse effects to special-status reptiles (see Impact WILD-2 (Alternative A) and Table 2-8).

Alternative C would affect nearly the same amount of potential habitat for blunt-nosed leopard lizard as Alternative A, but a larger portion of the habitat affected would be converted to Project infrastructure than under Alternative A, potentially resulting in a greater long-term effect on this species (if present). All adverse effects would be avoided and/or mitigated with implementation of the Conservation Measures BNLL-1 and BNLL-2 (Table 2-8). As a fully-protected species, direct take of blunt-nosed leopard lizards would be prohibited.

When comparing Alternative C to existing conditions, impacts to special-status reptiles would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative C to the No-Action Alternative). Because these impacts would be largely

temporary, would occur intermittently within the overall construction timeframe, and because conservation measures are in place to reduce, minimize, and compensate for impacts, they are considered **less than significant.**

Impact WILD-3 (Alternative C): ***Project Effects on Special-Status Bird Species.*** Compared to the No-Action Alternative, Alternative C could affect special-status bird species. Construction-related effects on special-status bird species would generally be the same as those described for Alternative A (see Impact WILD-1 [Alternative A]), with several exceptions. Unlike Alternative A, Alternative C would include the construction of the Fresno Slough Dam and the Short Canal. This change would result in temporary adverse effects to more habitat for most special-status birds than Alternative A (see Table 7-7) but for most species, less of this habitat would be converted to Project infrastructure. Similar to Alternative A, measures would be implemented to minimize these adverse effects to special-status birds (see Impact WILD-3 (Alternative A) and Table 2-8).

Though both Alternatives A and C include plans for a narrow floodplain, Alternative C features active riparian and floodplain restoration and would not include agricultural or grazing use within the floodplain. Implementation of Alternative C would result in more riparian habitat, and thus available nesting habitat for Swainson's hawks, white-tailed kites, and short-eared owls. In comparison to Alternative A and the No-Action Alternative, post-project conditions may provide less foraging habitat for birds that use open, grassland or crop cover, including mountain plovers, loggerhead shrikes, long-billed curlews, and yellow-headed blackbirds.

When comparing Alternative C to existing conditions, impacts to special-status birds would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative C to the No-Action Alternative). Because the majority of these impacts would be temporary and would occur intermittently within the overall construction timeframe, conservation measures are in place to reduce and minimize impacts, and active restoration of riparian habitats would occur, they are considered **less than significant**.

Impact WILD-4 (Alternative C): ***Project Effects on Special-Status Mammal Species.*** Compared to the No-Action Alternative, Alternative C could affect special-status mammal species. Construction-related effects on special-status mammal species would generally be the same as those described for Alternative A (see Impact WILD-4 [Alternative A]), with several exceptions.

Unlike Alternative A, Alternative C would include the construction of the Fresno Slough Dam and the Short Canal. These changes would convert less habitat area for special-status mammals to Project infrastructure, though slightly more habitat area would be affected temporarily for most species (see Table 7-7). Similar to Alternative A, measures would be implemented to minimize these adverse effects to special-status mammals (see Impact WILD-4 [Alternative A] and Table 2-8).

Following construction of Alternative C Project components, wetland, floodplain, and riparian areas would be planted and irrigated until vegetation is established (see Chapter 2.0, "Description of Alternatives"). Though both Alternatives A and C include plans for a

narrow floodplain, active restoration and restriction of agricultural or grazing use within the floodplain would result in more riparian habitat, which would be beneficial to the western red bat and the western mastiff bat.

When comparing Alternative C to existing conditions, impacts to special-status mammals would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative C to the No-Action Alternative). Because impacts would be temporary and would occur intermittently within the overall construction timeframe, conservation measures are in place to reduce and minimize impacts, and active restoration of riparian habitats would occur, the impacts are considered **less than significant**.

Impact WILD-5 (Alternative C): *Adverse Effects on Wildlife Movement Corridors.* Compared to the No-Action Alternative, Alternative C could affect wildlife movement along migration corridors. Construction-related effects on migration corridors would generally be the same as those described for Alternative A (see Impact WILD-5 [Alternative A]), with several exceptions.

Following construction of Alternative C Project components, wetland, floodplain, and riparian areas would be planted and irrigated until vegetation is established (see Chapter 2.0, "Description of Alternatives"). Though both Alternatives A and C include plans for a narrow floodplain, this active restoration and restriction of agricultural or grazing use within the floodplain would result in more riparian habitat, potentially providing better cover and forage for migrating wildlife.

When comparing Alternative C to existing conditions, impacts to movement corridors would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative C to the No-Action Alternative). Most of these impacts would be temporary and would occur intermittently within the overall construction timeframe for the entire Project. Post-project conditions would return natural habitats to much of the disturbed areas and are expected to increase riparian vegetation, potentially improving conditions for migratory species. Impacts of Alternative C to movement corridors are considered **less than significant.**

Impact WILD-6 (Alternative C): *Long-term Habitat Improvement in Reach 2B.* Compared to the No-Action Alternative, Restoration Flows in Reach 2B would be conveyed through an expanded floodplain. Wetland communities would develop within the main channel, a dense riparian scrubland would develop along the main river channel banks, and bands of other habitat types (wetland, scrub, grassland, and forest) would develop at higher elevations along the channel corridor. The wetland, floodplain, and riparian areas would be planted following construction and then irrigated and managed as necessary during the establishment period.

Active riparian and floodplain habitat restoration would improve native floodplain and in-channel habitats, which would likely benefit native and potentially special-status species. Benefits to native species would be realized through the re-introduction of perennial base flows as well as seasonal high flows in the river, which in turn would promote the establishment of riparian vegetation. Well-established native plant

communities in the floodplain would support rich and diverse native flora, potentially including special-status plant species, and would provide foraging habitat and shelter for native wildlife species.

When comparing Alternative C to existing conditions, effects on long-term opportunities for habitat improvement in Reach 2B would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative C to the No-Action Alternative). According to habitat restoration estimates, Alternative C could provide up to 1,360 acres of wildlife habitat and up to 1,050 acres of special-status species habitat (not mutually exclusive areas) (SJRRP 2012, Attachment A). For many of these habitat types, this represents a 2- to 5-fold increase in habitat as compared to existing conditions. In general, implementation of Alternative C would cause a **beneficial** effect on wildlife habitat.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D would include construction of Project features including Fresno Slough Dam, a new levee system with a wide floodplain encompassing the river channel, and the North Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the North Canal bifurcation structure, and the North Canal fish passage facility, removal of the San Joaquin River control structure of the Chowchilla Bifurcation Structure, removal of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Similar to Alternative A, Alternative D includes passive riparian habitat restoration and agricultural practices in the floodplain. It is assumed that over time wetland communities and a dense riparian scrubland would develop along the main channel and river banks, respectively. The Restoration Flows would be used to recruit new vegetation along the channel from the existing seed bank. Between the main river channel banks and the proposed levees, limited agricultural practices (e.g., pasture) would occur.

Table 7-8 summarizes habitat impacts by acreage for all vertebrate species with the potential to occur in the Project area. These acreages represent the worst-case scenario where all existing floodplain areas are assumed to be impacted.

Table 7-8.
Species Habitat Potentially Affected by Alternative D

Scientific Name	Common Name	Habitat Type	Maximum Impacted Area (acres)			
			Floodplain (future habitat or agriculture)	Infrastructure (not future habitat)	Borrow (future habitat or agriculture)	Other (future habitat or agriculture)
Reptiles						
Actinemys marmorata	western pond turtle	Upland	168	22	45	8
		Aquatic	146	23	42	25

Table 7-8.
Species Habitat Potentially Affected by Alternative D

Scientific Name	Common Name	Habitat Type	Maximum Impacted Area (acres)			
			Floodplain (future habitat or agriculture)	Infrastructure (not future habitat)	Borrow (future habitat or agriculture)	Other (future habitat or agriculture)
		Wetland	29	5	3	9
Anniella pulchra pulchra	silvery legless lizard	Habitat	431	65	207	29
Gambelia sila	blunt-nosed leopard lizard	Habitat	6	9	0	0
Masticophis flagellum ruddocki	San Joaquin coachwhip	Habitat	149	19	200	9
Phrynosoma blainvillii	coast horned lizard	Habitat	225	36	202	9
Thamnophis gigas	giant garter snake	Upland	168	22	45	8
		Aquatic	146	23	42	25
		Wetland	29	5	3	9
Birds						
Agelaius tricolor	tricolored blackbird	Foraging	365	156	350	46
		Nesting	141	17	25	22
Anser albifrons elgasi	greater white-fronted goose	Foraging	259	32	46	33
Asio flammeus	short-eared owl	Foraging and Nesting	144	22	200	50
		Foraging	277	146	350	9
Athene cunicularia	burrowing owl	Foraging and Nesting	144	22	200	9
		Foraging	277	146	350	50
Aythya americana	redhead	Foraging	217	25	42	25
		Nesting	42	7	3	9
Buteo swainsoni	Swainson's hawk	Foraging	508	169	350	50
		Nesting	281	46	7	19
Charadrius montanus	mountain plover	Foraging	421	169	350	59
Circus cyaneus	northern harrier	Foraging	297	150	350	50
		Nesting	230	27	204	18
Elanus leucurus	white-tailed kite	Foraging	532	173	350	68
		Nesting	281	46	7	19
Grus canadensis canadensis	lesser sandhill crane	Foraging	507	173	350	68
Grus canadensis tabida	greater sandhill crane	Foraging	507	173	350	68

Table 7-8.
Species Habitat Potentially Affected by Alternative D

Scientific Name	Common Name	Habitat Type	Maximum Impacted Area (acres)			
			Floodplain	Infrastructure	Borrow	Other
			(future habitat or agriculture)	(not future habitat)	(future habitat or agriculture)	
Lanius ludovicianus	loggerhead shrike	Foraging	401	165	350	59
		Foraging and Nesting	20	4	0	0
Numenius americanus	long-billed curlew	Foraging	421	169	350	59
Pelecanus erythrorhynchos	American white pelican	Foraging	259	32	46	33
Xanthocephalus xanthocephalus	yellow-headed blackbird	Foraging	401	165	350	59
		Nesting	105	8	4	9
Mammals						
Dipodomys nitratoides exilis	Fresno kangaroo rat	Habitat	6	9	0	0
Eumops perotis californicus	Western mastiff bat	Foraging	573	194	350	59
Lasiurus blossevillii	Western red bat	Roosting and Foraging	1054	237	350	40
Taxidea taxus	American badger	Habitat	149	19	200	9

Notes:
Floodplain = floodplain of the San Joaquin River (passive restoration and agricultural activities)
Infrastructure = structures, levees, or roads
Borrow = maximum amount disturbed to take fill materials for levees (reseeded)
Other = construction staging areas, temporary access roads, and other construction-related disturbances (reseeded)

Impact WILD-1 (Alternative D): ***Project Effects on Special-Status Invertebrate Species.*** Compared to the No-Action Alternative, Alternative D could affect special-status invertebrate species. Construction-related effects on special-status invertebrate species would generally be the same as those described for Alternative A (see Impact WILD-1 [Alternative A]), with several exceptions.

Unlike Alternative A, Alternative D would use the river channel for Restoration Flows and the North Canal to convey water from the San Joaquin River to Mendota Pool. These infrastructure differences would result in fewer effects on elderberry shrubs, in comparison to Alternative A (i.e., 13 shrubs from riparian areas and 3 shrubs from non-riparian areas). Up to 523 additional shrubs located in the future floodplain area are potentially affected. Conservation Measures VELB-1 and VELB-2 include pre-construction surveys for elderberry shrubs and beetle exit holes, avoidance of elderberry shrubs found in the Project area, and compensatory mitigation for shrubs unavoidable during construction (Table 2-8). The future floodplain area would be allowed to return to

natural habitats after Project construction is complete, which would provide suitable habitat for elderberry shrubs after construction is complete, especially along the main river channel banks where many of the elderberry shrubs occur now.

Construction activity under Alternative D is expected to take 158 months, therefore, adverse effects of construction would occur over an approximately 2 year longer period compared to Alternative A. Alternatives A and D both allow for agricultural or grazing use within the floodplain.

When comparing Alternative D to existing conditions, impacts to special-status invertebrate species would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative D to the No-Action Alternative). Because unavoidable impacts would be compensated for through implementation of the Project conservation measures and because the completed Project would provide habitat for elderberry shrubs, the impacts are considered **less than significant**.

Impact WILD-2 (Alternative D): ***Project Effects on Special-Status Reptile Species*****.** Compared to the No-Action Alternative, Alternative D could affect some special-status reptile species. Construction-related effects on special-status reptile species would generally be the same as those described for Alternative A (see Impact WILD-1 [Alternative A]), with several exceptions.

The features of Alternative D would displace more habitat for silvery legless lizards. Habitats converted to Project infrastructure would be less for the other special-status reptile species, excepting the aquatic and wetland habitats for the giant garter snake and the western pond turtle (see Table 7-8). Alternative D would use the river channel to convey Restoration Flows through Reach 2B (instead of a Compact Bypass). This method essentially removes the slackwater habitat for giant garter snake in the San Joaquin arm of Mendota Pool following Project completion (see Impact WILD-2 [Alternative A]). Similar to Alternative A, measures would be implemented to minimize adverse effects to special-status reptiles (see Impact WILD-2 [Alternative A] and Table 2-8).

Alternative D would potentially affect slightly less total habitat for blunt-nosed leopard lizard than Alternative A and less of the habitat affected would be converted to Project infrastructure. All adverse effects would be avoided and/or mitigated with implementation of the Conservation Measures BNLL-1 and BNLL-2 (Table 2-8). As a fully-protected species, direct take of blunt-nosed leopard lizards would be prohibited.

Construction activity under Alternative D is expected to take 158 months, therefore, adverse effects of construction would occur over an approximately 2 year longer period compared to Alternative A.

When comparing Alternative D to existing conditions, impacts to special-status reptiles would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative D to the No-Action Alternative). Because these impacts would be largely temporary, would occur intermittently within the overall construction timeframe, and

conservation measures are in place to reduce, minimize, and compensate for impacts, they are considered **less than significant.**

Impact WILD-3 (Alternative D): *Project Effects on Special-Status Bird Species*. Compared to the No-Action Alternative, Alternative D could affect special-status bird species. Construction-related effects on special-status bird species would generally be the same as those described for Alternative A (see Impact WILD-1 [Alternative A]), with several exceptions.

Unlike Alternative A, Alternative D would include the construction of the Fresno Slough Dam and the North Canal. These changes would result in adverse effects to more habitat for all of the special-status birds in areas near the river, than Alternative A (see Table 7-8). For a few of these species (including the nesting habitats of burrowing owls, tricolored blackbirds, short-eared owls, and northern harriers), less of this habitat would be converted to long-term infrastructure. Similar to Alternative A, measures would be implemented to minimize these adverse effects to special-status birds (see Impact WILD-3 (Alternative A) and Table 2-8).

Both Alternatives A and D allow for agricultural or grazing use within the floodplain. In comparison to Alternative A (narrow floodplain), post-project conditions of Alternative D (wide floodplain) may provide more foraging habitat for birds that use open, grassland or crop cover, including mountain plovers, loggerhead shrikes, long-billed curlews, and yellow-headed blackbirds.

Construction activity under Alternative D is expected to take 158 months, therefore, adverse effects of construction would occur over an approximately 2 year longer period compared to Alternative A.

When comparing Alternative D to existing conditions, impacts to special-status birds would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative D to the No-Action Alternative). Because the majority of these impacts would be temporary and would occur intermittently within the overall construction timeframe, conservation measures are in place to reduce and minimize impacts, and active restoration of riparian habitats would occur, they are considered **less than significant**.

Impact WILD-4 (Alternative D): *Project Effects on Special-Status Mammal Species.* Compared to the No-Action Alternative, Alternative D could affect special-status mammal species. Construction-related effects on special-status mammal species would generally be the same as those described for Alternative A (see Impact WILD-4 [Alternative A]), with several exceptions.

Unlike Alternative A, Alternative D would include the construction of the Fresno Slough Dam and North Canal. More habitat for special-status mammal species would be disturbed by construction activities near the river, though less habitat for American badgers and Fresno kangaroo rats would be converted to Project infrastructure (see Table 7-8). Similar to Alternative A, measures would be implemented to minimize these

adverse effects to special-status mammals (see Impact WILD-4 [Alternative A] and Table 2-8).

Construction activity under Alternative D is expected to take 158 months, therefore, adverse effects of construction would occur over an approximately 2 year longer period compared to Alternative A.

When comparing Alternative D to existing conditions, impacts to special-status mammals would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative D to the No-Action Alternative). Because these impacts would be temporary and would occur intermittently within the overall construction timeframe, conservation measures are in place to reduce and minimize impacts, and active restoration of riparian habitats would occur, the impacts are considered **less than significant**.

Impact WILD-5 (Alternative D): ***Adverse Effects on Wildlife Movement Corridors*****.** Compared to the No-Action Alternative, Alternative D could affect wildlife movement along migration corridors. Construction-related effects on migration corridors would generally be the same as those described for Alternative A (see Impact WILD-5 [Alternative A]), with several exceptions**.**

Alternative A includes plans for a San Mateo Avenue crossing. In Alternative D, this crossing would be removed. This would not alter bird movement, but the crossing may provide a way for other terrestrial species to cross the river. Compared to the No-Action Alternative, the restoration of a riparian corridor would facilitate movement and provide habitat for many special-status species, including valley elderberry longhorn beetles, Swainson's hawks, white-tailed kites, tricolored blackbirds, yellow-headed blackbirds and western red bats.

When comparing Alternative D to existing conditions, impacts to movement corridors would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative D to the No-Action Alternative). Most of these impacts would be temporary and would occur intermittently within the overall construction timeframe for the entire Project. Post-project conditions would return natural habitats to much of the disturbed areas and are expected to increase riparian vegetation, potentially improving conditions for migratory species. Impacts of Alternative D to movement corridors are considered **less than significant.**

Impact WILD-6 (Alternative D): ***Long-term Habitat Improvement in Reach 2B*****.** Compared to the No-Action Alternative, Restoration Flows in Reach 2B would be conveyed through an expanded floodplain. Over time wetland communities would develop within the main channel and a dense riparian scrubland would develop along the main river channel banks. The Restoration Flows would be used to recruit new vegetation along the channel from the existing seed bank. Between the main river channel banks and the proposed levees, limited agricultural practices (e.g., pasture) would occur.

Passive riparian habitat restoration of the San Joaquin River would improve native floodplain and in-channel habitats, which would likely benefit native and potentially

special-status species such as Swainson's hawk and greater sandhill crane. Benefits to native species would be realized through the re-introduction of perennial base flows as well as seasonal high flows in the river, which in turn would promote the establishment of riparian vegetation. Well-established native plant communities in the floodplain would support rich and diverse native flora, including potentially special-status plant species, and would provide foraging habitat and shelter for native wildlife species.

When comparing Alternative D to existing conditions, effects on long-term opportunities for habitat improvement in Reach 2B would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative D to the No-Action Alternative). According to habitat restoration estimates, Alternative D could provide up to 1,900 acres of wildlife habitat and up to 1,630 acres of special-status species habitat (not mutually exclusive areas) (SJRRP 2012, Attachment A). For many of these habitat types, this represents a 3- to 9-fold increase in habitat as compared to existing conditions. In general, implementation of Alternative D would cause a **beneficial** effect on wildlife habitat.

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8.0 Climate Change and Greenhouse Gas Emissions

This chapter describes the environmental and regulatory setting for climate change and greenhouse gas emissions, as well as the environmental consequences associated with the construction and operation of Project alternatives, including impacts and mitigation measures.

8.1 Environmental Setting

8.1.1 Greenhouse Gases

Radiation from the sun is the primary source of energy keeping the earth warm enough for life. Solar radiation enters the earth's atmosphere, a portion of the radiation passes through the atmosphere and is absorbed by the earth's surface (this is primarily radiation in the visible portion of the electromagnetic spectrum), a portion is reflected back toward space, and a portion is absorbed by the upper atmosphere. The radiation absorbed by the earth heats the earth's surface which then emits infrared radiation. Since the earth has a much lower temperature than the sun, it emits longer wavelength radiation.[1]

Certain gases in the earth's atmosphere, classified as greenhouse gases (GHGs), play a critical role in determining the earth's surface temperature. GHGs have strong absorption properties at wavelengths that are emitted by the earth. As a result, radiation that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the "greenhouse effect," is responsible for maintaining a habitable climate on Earth.

Prominent GHGs contributing to the greenhouse effect are water vapor, carbon dioxide (CO_2), methane, ozone, nitrous oxide (N_2O), and fluorinated compounds (chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride). Human-caused emissions of these GHGs in excess of natural ambient concentrations are responsible for intensifying the greenhouse effect and have led to a warming trend of the earth's climate, known as global climate change or global warming. Global temperatures have increased over the past 50 years and it is unlikely that the increase can be explained without the contribution of GHGs from human activities (Intergovernmental Panel on Climate Change [IPCC] 2014).

Although preliminary research has also found localized effects from GHGs, climate change is largely a global problem. GHGs pollutants have global implications, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern. Whereas pollutants with localized air quality effects have relatively short

[1] The wavelength at which a body emits radiation is proportional to the temperature of the body.

atmospheric lifetimes (e.g., about 1 day), GHGs have long atmospheric lifetimes (1 year to several thousand years). GHGs persist in the atmosphere for long enough time periods to be dispersed around the globe. CO_2 is one of the major human contributed GHGs. Of the total annual human-caused CO_2 emissions, less than 45 percent is sequestered (removed from the atmosphere and stored) through ocean uptake, uptake by northern hemisphere forest regrowth, and other terrestrial sinks. The remaining human-caused CO_2 emissions remain stored in the atmosphere (IPCC 2014, Ballantyne et al. 2012).

The atmosphere and the oceans are reaching their capacity to absorb CO_2 and other GHGs, without significantly changing the Earth's climate. The increase in GHGs in the Earth's climate is projected to affect a wide range of issues and resources, including sea-level rise, flooding, water supply, agricultural and forestry resources, and energy demand. California's Climate Change Portal (www.climatechange.ca.gov) states:

> *Climate change is expected to have significant, widespread impacts on California's economy and environment. California's unique and valuable natural treasures - hundreds of miles of coastline, high value forestry and agriculture, snow-melt fed fresh water supply, vast snow and water fueled recreational opportunities, as well as other natural wonders - are especially at risk.*

In addition, the IPCC, in the section of its Fifth Assessment Report by Working Group II, "Climate Change 2014: Impacts, Adaptation, and Vulnerability" (IPCC 2014; released March 31, 2014), specific to North America (Chapter 26), stated in part:

> *North American ecosystems are under increasing stress from rising temperatures, CO_2 concentrations, and sea-levels, and are particularly vulnerable to climate extremes (very high confidence). Climate stresses occur alongside other anthropogenic influences on ecosystems, including land-use changes, non-native species, and pollution, and in many cases will exacerbate these pressures (very high confidence) [26.4.1; 26.4.3]. Evidence since the Fourth Assessment Report (IPCC 2007) highlights increased ecosystem vulnerability to multiple and interacting climate stresses in forest ecosystems, through wildfire activity, regional drought, high temperatures, and infestations (medium confidence) [26.4.2.1; Box 26-2]; and in coastal zones due to increasing temperatures, ocean acidification, coral reef bleaching, increased sediment load in run-off, sea level rise, storms, and storm surges (high confidence) [26.4.3.1].*

California has already been affected by climate change: sea-level rise, increased average temperatures, more extreme hot days and increased heat waves, fewer shifts in the water cycle, and increased frequency and intensity of wildfires. Higher sea levels can result in increased coastal erosion (which may have a secondary effect, such as uncovering shoreline hazards), more frequent flooding from storm surges, increased property damage, and reduced waterfront public access options. Other projected climate change impacts in California include: decreases in the water quality of surface waterbodies, groundwater, and coastal waters; decline in aquatic ecosystem health; lowered profitability for water-intensive crops; changes in species and habitat distribution; and

impacts to fisheries (California Regional Assessment Group 2002). These effects are expected to increase with rising GHG levels in the atmosphere.

The quantity of GHGs that it takes to cause a change in climate is not precisely known; however, the quantity is enormous. The estimated global annual emission of anthropogenic GHGs was 46 billion metric tons in 2010 (U.S. Environmental Protection Agency [EPA] 2014a). Of this, agriculture was estimated to contribute about 11.5 percent, or about 5.3 billion metric tons of GHGs (Food and Agriculture Organization of the United Nations 2014). This compares with the estimated emissions from California of 0.453 billion metric tons or about 1 percent of the global emissions (California Air Resources Board [ARB] 2014a). Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the burning of fossil fuels, industrial/manufacturing, transportation, and agricultural sectors, as well as land use change (EPA 2014a).

California is the 15th largest emitter of CO_2 in the world (California Air Resources Board [ARB] 2011). California produced 451.6 teragrams (Tg; or million metric tons) of CO_2 equivalents[2] (CO_2e) in 2010 (ARB 2013). The five major fuel consuming sectors contributing to CO_2 emissions from fossil fuel combustion are transportation, electricity generation, industrial, residential, and commercial. Combustion of fossil fuel in the transportation sector was the single largest source of California's GHG emissions, accounting for 38 percent of total GHG emissions in California. This sector was followed by the electric power sector (including both in-state and out-of-state sources) at 21 percent and the industrial sector at 19 percent (ARB 2013).

Methane is a highly potent GHG that results from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions) largely associated with agricultural practices, landfills, and wetlands. CO_2 sinks, or reservoirs, include vegetative growth (which convert CO_2 to biomass) and the ocean, which absorbs CO_2 through photosynthesis by phytoplankton and dissolution, respectively, two of the most common processes of CO_2 sequestration (EPA 2014b).

Agriculture activities contributed 32.4 Tg CO_2e or 7 percent of California emissions. Of the 32.4 Tg CO_2e, agricultural emissions from crop growing and harvesting (including soil management and rice cultivation) accounted for 10 Tg CO_2e (ARB 2013). The remainder was mainly due to enteric fermentation for livestock and manure management (Figure 8-1).

The Project would involve changes to agriculture, wetlands, and riparian zones. The basic GHG emissions associated with these land use and management types is described below.

[2] CO_2e is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. This potential, known as the global warming potential (GWP) of a GHG, is dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. Expressing emissions in CO_2e takes the contributions of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

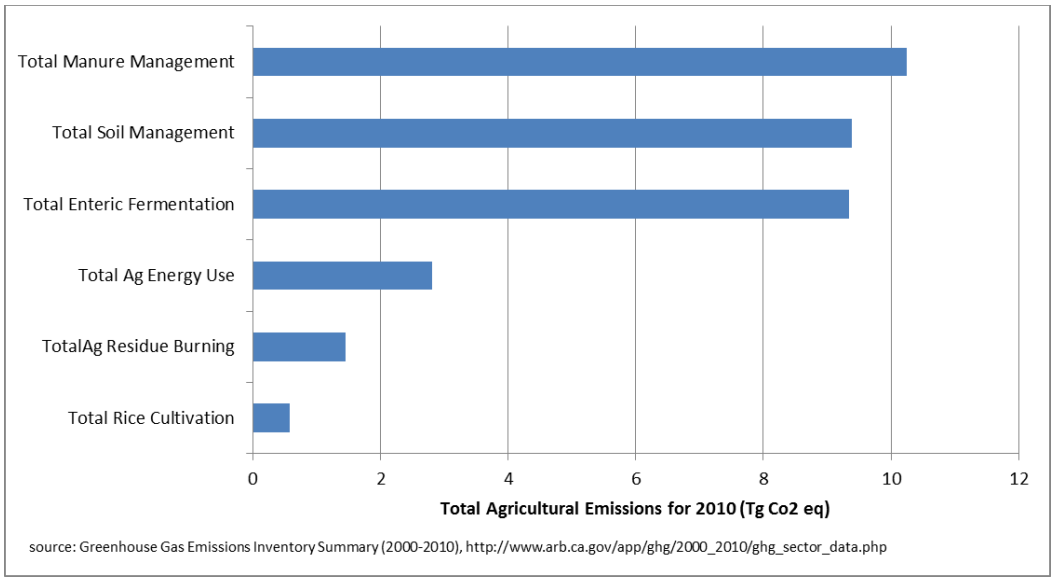

Figure 8-1.
2010 Estimated Breakdown of Agricultural GHG Sources for California

Agricultural soils emit N_2O, but act as net sinks for CO_2. In the United States, agricultural soils have accounted for approximately 75 percent of N_2O emissions and 5 percent of total emissions in 2012 (EPA 2014b). While total N_2O emissions are much lower than CO_2 emissions, N_2O is approximately 300 times more powerful than CO_2 at trapping heat in the atmosphere. Estimated emissions from agricultural soils were 306.6 Tg CO_2e in 2012 (EPA 2014b).

Nitrous oxide is produced naturally in soils through the microbial processes of nitrification and denitrification. A number of agricultural activities increase mineral Nitrogen (mineral N) availability in soils, thereby increasing the amount available for nitrification and denitrification, and ultimately the amount of N_2O emitted. These activities increase soil mineral N either directly or indirectly. Management practices that add or lead to greater release of direct emissions include fertilization, application of manure and other organic materials, deposition of manure on soils by domesticated animals in pastures, rangelands, and paddocks, production of N-fixing crops and forages, retention of crop residues, and drainage and cultivation of organic cropland soils (i.e., soils with a high organic matter content, for example peat soils as found in the Delta). Other agricultural soil management activities, including irrigation, drainage, tillage practices, and fallowing of land, can influence N mineralization in soils and thereby affect direct emissions. Mineral N is also made available in soils through decomposition of soil organic matter and plant litter, as well as asymbiotic fixation of N from the atmosphere, and these processes are influenced by agricultural management through impacts on moisture and temperature regimes in soils. Indirect emissions of N_2O occur through two pathways: (1) volatilization and subsequent atmospheric deposition of applied/mineralized N, and (2) surface runoff and leaching of applied/mineralized N into groundwater and surface water (Massy and Ulmer 2010, EPA 2014b).

Soils contain both organic and inorganic forms of carbon. Soil organic carbon stocks are the main source and sink for atmospheric CO_2 in most soils and account for about 1 percent of the total net CO_2 flux in the United States (EPA 2014b). In agricultural soils, mineral and organic soils sequester approximately four times as much carbon as is emitted from these soils through liming and urea fertilization. Net carbon uptake is largely due to a reduction in summer fallow areas in semi-arid areas, the adoption of conservation tillage practices, and application of organic fertilizers to agriculture lands. Although CO_2 is sequestered in agricultural soils, the amount of CO_2 uptake is small compared to CO_2e emitted as N_2O.

Wetlands are one of the largest natural sources of GHGs and are the major natural source of methane due to high rates of methanogenesis enabled by the presence of anaerobic soils (Altor and Mitsch 2006). Wetland plants uptake CO_2, which is converted to biomass and stored in organic soils. This storage of carbon in organic soils has resulted in a large carbon pool. The creation of wetlands can result in either a net increase or decrease in GHGs depending upon the time frame of interest and the characteristics of the wetland. On a mole for mole basis,[3] methane is a much more potent GHG than is CO_2. Over a 100-year time frame, it has about 21 times as much global warming potential (GWP)[4] as CO_2. Over shorter time frames, it has an even greater GWP due to the lifetime of methane in the atmosphere. Methane is oxidized to CO_2 and carbon monoxide (CO) in about 10 years. So in general, a wetland can initially be considered a net GHG source and over time as more carbon is sequestered in organic soils a net GHG sink. The time required for the wetland to change from a net source to a net sink depends upon the ratio of carbon emitted as methane to carbon sequestered as CO_2. Whiting and Chanton (2001) studied the rate of sequestration of carbon and the rate of methane emission from several different types of wetlands. Their data showed that the wetlands they studied would be net sources for 20 years, some sources and some sinks after 100 years, and all sinks after 500 years. However, estimates of the GWP have increased since their study, so their results can be considered as low estimates.

Riparian zones that are oxic (contain oxygen) are net sinks for methane and sources of N_2O. Aerated soil contains methanotrophic bacteria that use methane as their carbon source. N_2O is produced in riparian soils primarily through decomposition of soil organic matter and plant litter, as well as asymbiotic fixation of N from the atmosphere. Tanzosh (2005) studied two watersheds in Ohio, each of which contained upland agricultural land, riparian grassland and riparian forest. Her results showed that the riparian grassland had the greatest GWP, but was only slightly more than the upland sites. The forested areas had the smallest GWP. However, carbon can be sequestered in riparian soils if the conditions are advantageous. This would occur when the conditions are right for the formation of soils that incorporate carbon into the soil matrix so it is available for plant use. If the rate of plant growth is large it is possible for the sequestration to exceed the carbon emitted as GHGs.

[3] A mole is a unit of measurement used to express an amount of chemical substance (i.e., 6.022×10^{23} molecules).

[4] GWP is the potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect over a specified time period (e.g., 100 years).

8.1.2 Temperature, Precipitation, and Runoff

Historical Climate

The historical climate of the Central Valley is characterized by hot, dry summers and cool, damp winters. Summer daytime temperatures can reach 90 degrees Fahrenheit (°F) with occasional heat waves bringing temperatures exceeding 115°F. The majority of precipitation occurs from mid-autumn to mid-spring. In winter, temperatures below freezing may occur, but snow is rare in the valley lowlands and foothills. During the growing season, relative humidity is characteristically low; in the winter, humidity is usually moderate to high, and ground fog may form.

The inter-annual variability of the Central Valley climate is strongly influenced by conditions occurring in the Pacific Ocean, including the El Nino Southern Oscillation and the existence of a semi-permanent high-pressure area in the northern Pacific Ocean. Although variable, the average mean-annual temperature has increased by approximately 2°F during the course of the 20th century for both the Sacramento River Basin and the San Joaquin River Basin.

Streamflow in the Sacramento River and San Joaquin River basins has also varied considerably from year to year and is varied geographically. Runoff is generally greater during the winter and spring months, with winter runoff generally originating from rainfall-runoff events and spring to early summer runoff generally supported by snowmelt from the Sierra Nevada. Historical changes in climate have resulted in declining spring runoff and a corresponding increase in winter runoff.

Future Projections

Climate change is a complex phenomenon that results in changes to several different aspects of the climate. One of the major impacts of climate change is an increase in average temperature. The average air temperature in the Project area and vicinity is projected to increase from almost 4°F to over 6°F by the end of the century (2070-2090 period) compared to the baseline conditions (1961-1990) (Cal-Adapt 2012). This increase in temperature is expected to result in changes in precipitation patterns. Depending upon the assumptions and climate models used for a particular study, both wetter and drier conditions have been projected (Brekke et al. 2004, Pacific Northwest Research Station 2005, PRBO Conservation Science 2011). Overall, Cal-Adapt projects a possible decrease in the average annual precipitation of 0 to 2 inches in the Project area and vicinity. Climate change may result in changes to the pattern of snowfall in the mountains above Friant Dam, leading to less overall water storage in the mountains. Cal-Adapt projects that the April snow water equivalent in the mountains above Friant Dam could decrease by 80 to 90 percent in the lower elevations and 30 to 40 percent at the upper elevations by the year 2100 (Cal-Adapt 2012b). This would result in less spring and summer runoff into Millerton Reservoir than at present.

Climate modeling groups have produced hundreds of simulations of past and future climates for the IPCC Fourth Assessment Report. The World Climate Research Programme Working Group on Coupled Modelling helped to coordinate these activities through the Coupled Model Intercomparison Project Phase 3. These model results were

organized into a website hosted by the Lawrence Livermore National Laboratory (LLNL) and others (LLNL 2013). The U.S. Department of the Interior, Bureau of Reclamation (Reclamation), working with others, generated gridded (1/8 degree [°] by 1/8°, latitude by longitude) climate projections using these data. These projections were developed through support from the Reclamation WaterSMART Basin Studies Program as part of the West-Wide Climate Risk Assessments activity (Reclamation 2011). These projections consist of 16 different Global Climate Models and three different CO_2 emission scenarios from the IPCC Fourth Assessment Report. For several of the projections, results were provided using different initial conditions for a total of 112 different projections (the results of climate projection modeling are sensitive to the initial conditions used in the models). From these climate projections potential changes in hydrology were computed for three future decades: 2020s (water years 2020 to 2029), 2050s (water years 2050 to 2059) and 2070 (water years 2070 to 2079) from the reference 1990s' decade (water years 1990 to 1999). The reference 1990s is from the ensemble of simulated historical hydroclimates, not from the observed 1990s data.

Future Runoff Projections

The gridded model output was used to estimate runoff from watersheds covering the major Reclamation basins and the Western United States (Reclamation 2011). Runoff results for the San Joaquin River at Friant Dam (Figure 8-2) show the change in total annual runoff into Millerton Reservoir relative to the total annual runoff in the 1990 decade. For the period 2010 to 2050 the total annual runoff is expected to decrease to about 90 to 95 percent of the 1990 decade. By the end of the century the total annual runoff is expected to decrease to between 75 to 80 percent of the 1990 decade. This analysis is based on the median projection from 112 model outputs (Reclamation 2011). It should be noted that the variability between model results is large with the coefficient of variability (standard deviation divided by the mean) equal to about 1.

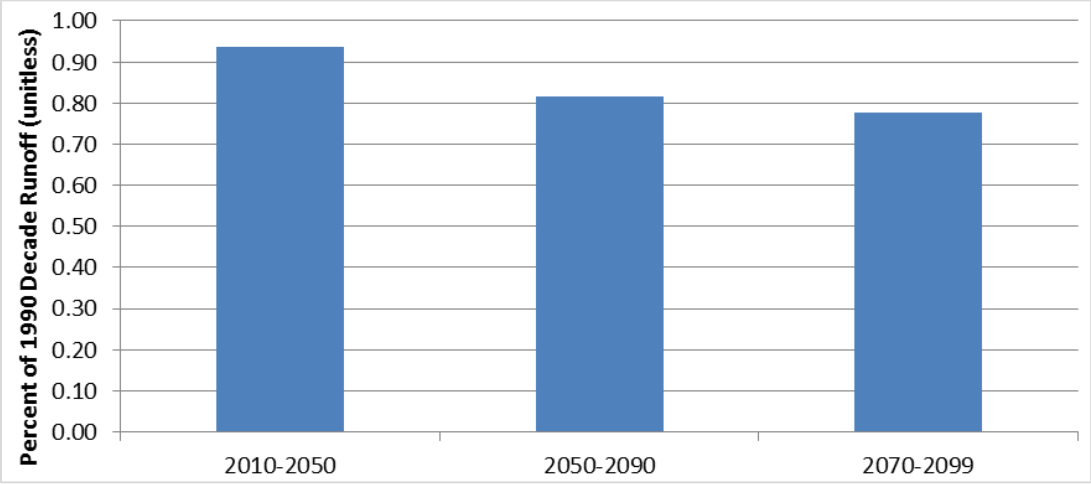

Figure 8-2.
Change in the Total Runoff into Millerton Reservoir Relative to 1990 Decade

In addition to the decrease in runoff, the timing of the runoff is expected to change. Figure 8-3 shows ensemble-median mean-monthly values (heavy lines) for the 1990s, 2020s, 2050s, and 2070s for the San Joaquin River at Friant Dam, and the decadal-spread of mean-monthly runoff for the 1990s (grey shaded area) and 2070s (magenta shaded area) where spread is bound by the ensemble's 5th to 95th percentile values for each month (the purple shaded area is where the spreads overlap). The spread shown in the figure does not represent the expected range in flows, but the uncertainty in the future projections. In general, in the future there would be more runoff in winter/spring (January to April) and less runoff in the summer (May to July). The change in inflows is small in the 2020 decade; the 2020 values are within the uncertainty of the 1990 and 2020 decades' data, so little effect would be expected on the timing of inflows during that period. By the 2070 decade, the results show a noticeable drop in runoff during the spring/summer period though there is a large uncertainty in the model predictions. Regardless, the operation of the larger dams in the San Joaquin River system, primarily Friant Dam, would determine the timing of summer flows in the San Joaquin River.

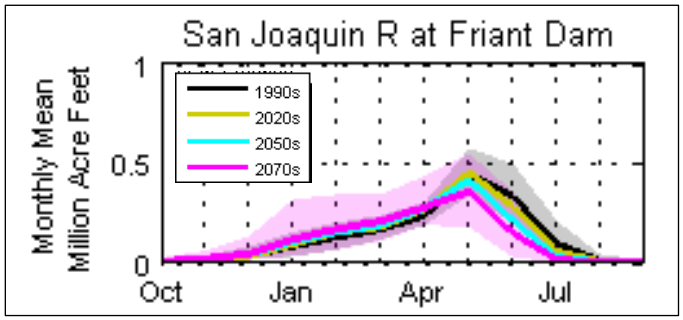

Figure 8-3.
Changes in Runoff to Friant Dam from 1990s to 2070s based on Analysis of 112 Different Combinations of Global Climate Models and Emission Scenarios

Future Water Temperature

The increase in air temperature due to climate change has the potential to increase water temperatures in the San Joaquin River. An estimate of the scale of the effect of increased air temperature on water temperature was made by estimating the equilibrium temperature of the water with and without climate change. The equilibrium temperature is the water temperature where there is zero net heat exchange between the water and its surroundings. If the meteorology conditions were constant for several days to a week or so, depending upon the depth of water and the meteorology, the river water temperature would eventually equal the equilibrium temperature. However, since the meteorology conditions are never constant, the water temperature tends to "chase" the equilibrium temperature, lagging its increase in the spring in summer as solar radiation and air temperature increases and in the fall and winter when solar radiation and air temperature decreases. The calculation of equilibrium temperature follows the procedures described in Bogan, Mohseni, and Stefan (2003) with the following assumptions:

- Cloud cover is zero.
- Wind speed is zero.
- No precipitation.
- Surface albedo = 0.31.

Figure 8-4 compares the equilibrium water temperature to measured water temperature in the San Joaquin River below the Chowchilla Bypass. Solar radiation and air temperature data for the calculation were obtained for the California Irrigation Management Information System (CIMIS) Station 7, Firebaugh/Telles (CIMIS 2013). Observed water temperature data were obtained for the California Data Exchange Center [CDEC] database for Station San Joaquin River below Bifurcation (SJB) (CDEC 2013). The observed water temperature lags the equilibrium temperature by 10 to 15 degrees centigrade (°C) (18 to 27°F), but can be almost 30°C (54°F) lower in the summer.

Figure 8-5 shows the increase in equilibrium water temperature, using the same 2012 data described above, for the cases of a 2, 4 and 6°C (3.6, 7.2 and 10.8°F) increase in air temperature.

In the winter the increase in equilibrium temperature is less than the increase in air temperature. However, in the summer the increase is greater indicating that summer water temperatures would be affected more than winter/spring water temperatures. This is driven by the increase in atmospheric long-wave radiation. Atmospheric radiation is modeled as a function of air temperature to the fourth power so increases in high air temperatures have a greater effect on water temperatures than increases in lower air temperatures. Note, that the actual increase in water temperature will likely be less than the increase in equilibrium temperatures shown in Figure 8-5 as the results shown in Figure 8-5 do not include cloud cover and wind speed which has the effect of lowering temperatures. Regardless, there is likely to be an increase in water temperature in Reach 2B due to climate change. The relative (to air temperature) increase will be small in the spring, but larger in the summer.

As the existing climate throughout California changes over time, the ranges of various plant, fish, and wildlife species could shift or be reduced, depending on the favored temperature and/or moisture regimes of each species. In the Project area, changes in vegetation, fish, and wildlife would depend, in part, upon water temperature, the amount of available water, and the available seed bank.

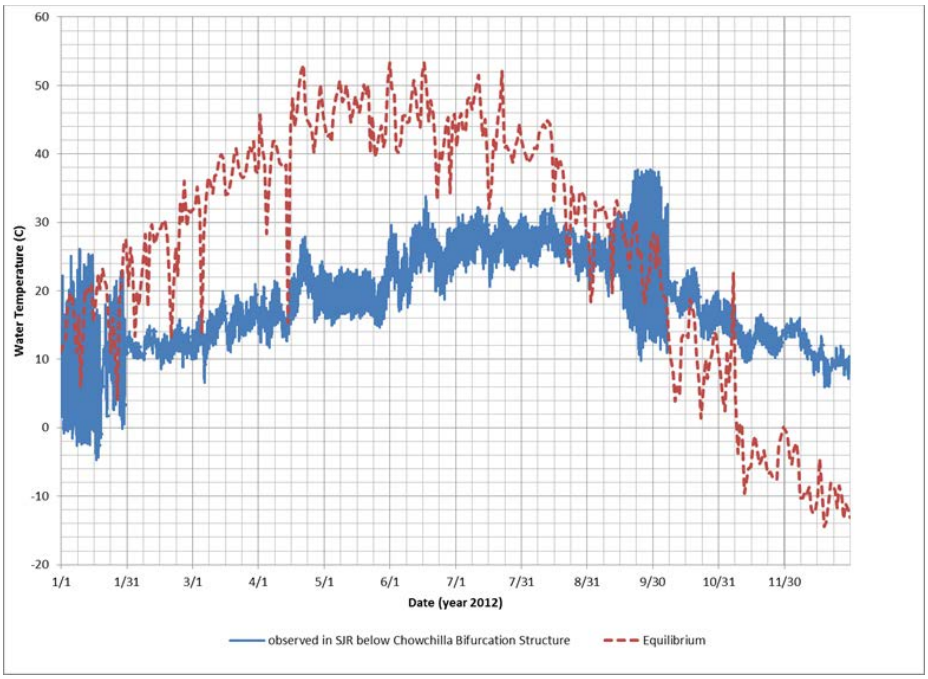

Figure 8-4.
Comparison between Measured and Equilibrium Water Temperatures in Reach 2B for Calendar Year 2012

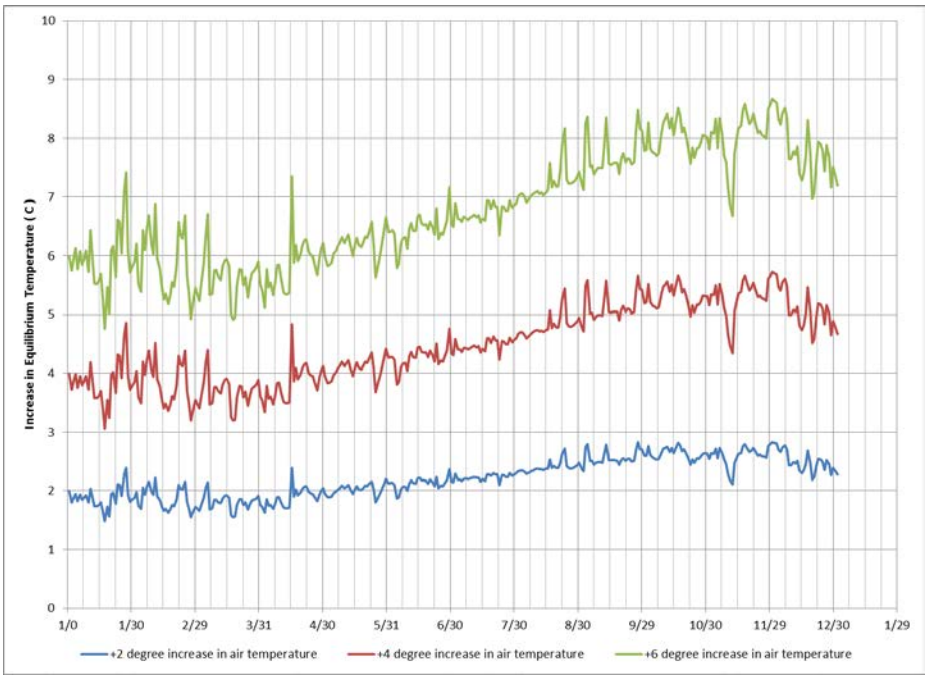

Figure 8-5.
Increase in Equilibrium Water Temperature for a Range of Increases in Air Temperature

8.2 Regulatory Setting

8.2.1 Federal

Climate change and GHG emission reductions are a concern at the Federal level. Laws and regulations, as well as plans and policies, address global climate change issues. This section summarizes key Federal regulations relevant to the Project.

EPA Endangerment and Cause and Contribute Findings

On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHGs under Section 202(a) of the Federal Clean Air Act (CAA):

- *Endangerment Finding:* the current and projected concentrations of the six key GHGs— CO_2, methane, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride—in the atmosphere threaten the public health and welfare of current and future generations.
- *Cause or Contribute Finding:* the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution, which threatens public health and welfare.

This endangerment finding was challenged and in *Massachusetts v. U.S. Environmental Protection Agency, et al*., 549 U.S. 497, the United States Supreme Court ruled that GHG does fit within the CAA's definition of a pollutant, and that the EPA has the authority to regulate GHG. Therefore, the endangerment finding by the EPA stands.

EPA Mandatory Greenhouse Gas Reporting Rule

On September 22, 2009, the EPA released its final GHG Reporting Rule. The reporting rule is a response to the Federal fiscal year 2008 Consolidated Appropriations Act (H.R. 2764; Public Law 110-161), that required the EPA to develop "… mandatory reporting of GHGs above appropriate thresholds in all sectors of the economy…." The reporting rule applies to most entities that emit 25,000 metric tons of CO_2e ($MTCO_2e$) or more per year. Since 2010, facility owners have been required to submit an annual GHG emissions report with detailed calculations of facility GHG emissions. The reporting rule also mandates recordkeeping and administrative requirements in order for the EPA to verify annual GHG emissions reports.

Council on Environmental Quality Guidance

On February 18, 2010, the White House Council on Environmental Quality (CEQ) released draft guidance regarding the consideration of GHG in National Environmental Policy Act (NEPA) documents for Federal actions. The draft guidelines include a presumptive threshold of 25,000 $MTCO_2e$ emissions from a proposed action to trigger a quantitative analysis. The CEQ has not established when GHG emissions are "significant" for NEPA purposes; rather, it poses the question to the public (CEQ 2010).

Executive Order 13514

Executive Order (EO) 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, signed on October 5, 2009, establishes "an integrated strategy towards sustainability in the Federal Government and makes reduction of GHG emissions

a priority for Federal agencies." Federal fleets would reach this vision by reducing fleet GHG emissions through reduced petroleum consumption. In March 2011, the CEQ issued instructions for implementing climate change adaptation planning in accordance with EO 13514.

Department of the Interior Climate Change Policy

The Department of the Interior has established a climate change impacts policy, which provides the following guidance:

- Ensure that climate adaptation plans are grounded in the best available science and understanding of climate change risks, impacts, and vulnerabilities, incorporating traditional knowledge where available.
- Consider climate change when developing or revising management plans, setting priorities for scientific research and assessments, and making major investment decisions.
- Use well-defined and established approaches, as appropriate, for managing through uncertainty, including: (1) vulnerability assessments, (2) scenario planning, (3) adaptive management, and (4) other risk management or structured decision making approaches.

8.2.2 State of California

Various statewide initiatives to reduce the State's contribution to GHG emissions have raised awareness that, even though the various contributors to and consequences of global climate change are not yet fully understood, global climate change is under way, and there is a real potential for severe adverse environmental, social, and economic effects in the long term.

Executive Order S-3-05

Executive Order (EO) S-3-05, which was signed by Governor Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the EO established total GHG emission targets. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050.

The EO directed the Secretary of the California Environmental Protection Agency (Cal/EPA) to coordinate a multi-agency effort to reduce GHG emissions to the target levels. The Secretary will also submit biannual reports to the governor and State legislature describing: progress made toward reaching the emission targets, impacts of global warming on California's resources, and mitigation and adaptation plans to combat these impacts. To comply with the EO, the Secretary of the Cal/EPA created the California Climate Action Team made up of members from various State agencies and commissions. The California Climate Action Team released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local governments, and the community, as well as through State

incentive and regulatory programs. The latest of these reports, *Climate Action Team Report to Governor Schwarzenegger and the California Legislature*, was published in December 2010 (Cal/EPA 2010).

As a result of the thorough scientific analysis collected in these biennial reports, the comprehensive Climate Adaptation Strategy was released in December 2009 after extensive interagency coordination and stakeholder input. The California Natural Resources Agency (CNRA), in coordination with other State agencies, has updated the 2009 California Climate Adaptation Strategy. The *Safeguarding California Plan* (CNRA 2014) augments previously identified strategies in light of advances in climate science and risk management options (see http://resources.ca.gov/climate/safeguarding/).

Executive Order B-30-15

EO B-30-15 was signed by Governor Brown in April 2015. This EO establishes a California greenhouse gas reduction target of 40 percent below 1990 levels by 2030. This target is in line with levels needed in the U.S. to limit global warming below 2 degrees Celsius and will also facilitate reaching the ultimate goal of reducing emissions 80 percent under 1990 levels by 2050. The EO also specifically addresses the need for climate adaptation and directs State government to:

- Incorporate climate change impacts into the State's Five-Year Infrastructure Plan.
- Update the Safeguarding California Plan - the state climate adaption strategy - to identify how climate change will affect California infrastructure and industry and what actions the state can take to reduce the risks posed by climate change.
- Factor climate change into State agencies' planning and investment decisions.
- Implement measures under existing agency and departmental authority to reduce greenhouse gas emissions.

The Global Warming Solutions Act of 2006

In 2006, California passed the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32; Health & Saf. Code, § 38500 et seq., or AB 32). AB 32 further details and puts into law the mid-term GHG emissions reduction target established in EO S-3-05 to reduce statewide GHG emissions to 1990 levels by 2020. AB 32 also identifies the ARB as the State agency responsible for the design and implementation of emissions limits, regulations, and other measures to meet the target.

The statute presents the schedule for each step of the regulatory development and implementation process. In accordance with the AB 32 statutory requirements, the ARB published a list of early-action GHG emissions reduction measures by June 30, 2007.

Prior to January 1, 2008, the ARB also identified the current level of GHG emissions by requiring statewide reporting and verification of GHG emissions from emitters and identified the 1990 levels of California GHG emissions. By January 1, 2010, the ARB adopted regulations to implement the early-action measures.

In December 2007, the ARB approved the 2020 emissions limit (1990 emissions level) of 427 million $MTCO_2e$ of GHGs. The 2020 target requires the reduction of 80 million $MTCO_2e$, or approximately 16 percent below the State's projected "business-as-usual" 2020 emissions of 507 million $MTCO_2e$.

Also in December 2007, the ARB adopted mandatory reporting and verification regulations pursuant to AB 32. The regulations became effective January 1, 2009, with the first reports covering 2008 emissions; the regulations were updated in 2012, and the updates became effective in 2013. The mandatory reporting regulations require reporting for major facilities that generate more than 10,000 $MTCO_{2e}$ per year. The ARB has met all of the statutorily mandated deadlines for promulgation and adoption of regulations.

Scoping Plan

On December 11, 2008, pursuant to AB 32, the ARB adopted the Climate Change Scoping Plan (Scoping Plan). This plan outlines how emissions reductions would be achieved from significant sources of GHGs via regulations, market mechanisms, and other actions. Six key elements, outlined in the Scoping Plan, are identified below to achieve emissions reduction targets:

- Expanding and strengthening existing energy efficiency programs, including building and appliance standards.
- Achieving a statewide renewable energy goal of 33 percent.
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system.
- Establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets.
- Adopting and implementing measures pursuant to existing State laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard.
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation.

The Scoping Plan also recommended 39 measures that were developed to reduce GHG emissions from key sources and activities while improving public health, promoting a cleaner environment, preserving our natural resources, and ensuring that the impacts of the reductions are equitable and do not disproportionately impact low-income and minority communities. These measures also put the State on a path to meet the long-term 2050 goal of reducing California's GHG emissions to 80 percent below 1990 levels.

To comply with AB 32 requirements for scoping plan updates, the ARB adopted the First Update to the AB 32 Scoping Plan in May 2014. The First Update defines the ARB's climate change priorities for the next 5 years and evaluates the alignment of long-term GHG reduction strategies with other State policy priorities areas.

8.2.3 Regional and Local

San Joaquin Valley Air Pollution Control District Guidance and Policy

The San Joaquin Air Pollution Control District (SJVAPCD) has established policies and guidance relating to GHG emissions from projects undergoing the California Environmental Quality Act Process (CEQA) process. On December 17, 2009, the SJVAPCD adopted the *Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA* to assist other lead agencies in establishing their own process for determining significance of project GHG impacts. The SJVAPCD also adopted the *District Policy – Addressing GHG Emission Impacts for Stationary Source Projects under CEQA when Serving as the Lead Agency* for its own use when serving as a lead agency. In support of the guidance document and policy, SJVAPCD also prepared a staff report, *Climate Change Action Plan: Addressing Greenhouse Gas Emissions under the California Environmental Quality Act*, which evaluates different approaches to assessing significance for GHG emission impacts (SJVAPCD 2009).

The guidance and policy rely on the use of performance based standards, otherwise known as Best Performance Standards, to assess significance of project specific GHG emissions on global climate change during the environmental review process, as required by CEQA. Lead agencies adopting this guidance as policy for addressing GHG impacts under CEQA would require that all projects with increased GHG emissions implement the Best Performance Standards, or otherwise demonstrate that project GHG emissions have been reduced by at least 29 percent from business-as-usual, to determine that a project would have a less than significant impact. The SJVAPCD has not established Best Performance Standards for construction or restoration projects.

8.3 Environmental Consequences and Mitigation Measures

8.3.1 Impact Assessment Methodology

This section focuses on the contribution of the Project alternatives to the buildup of GHGs in the atmosphere, which has been shown to contribute to climate change. It is unlikely that any single project by itself could have a significant impact on the environment with respect to GHGs. However, the cumulative effect of human activities has been clearly linked to quantifiable changes in the composition of the atmosphere, which has in turn been shown to be the main cause of global climate change.

The Project would emit GHGs from off-road construction equipment and worker vehicle trips associated with construction-related activities. Project operations would also result in GHG emissions, but only from worker vehicle trips to provide maintenance and operational support for the Project. The principal GHGs associated with the Project would be CO_2 and methane. The GHG emissions were quantified using the *Informal Guidance for California Department of Water Resources (DWR) Grantees: GHG Assessment for CEQA Purpose*.

Direct GHG emissions from construction equipment exhaust were estimated using the same models used for estimating criteria pollutant emissions (i.e., Roadway Construction Emissions Model [RoadMod], which incorporates ARB's In-Use Offroad 2011 Emission Inventory Model for off-road equipment and Emission Factors Modeling Software [EMFAC] for on-road mobile sources). These models only provide emission factors for CO_2 and methane. CO_2e emissions were estimated by multiplying the CO_2 and methane emission by their respective GWP factors. N_2O emissions are small and their exclusion has no material impact on the overall calculation of GHG emissions.

Indirect GHG emissions associated with electricity and water use are not quantified as these would be minimal compared to the amount of emissions from offroad equipment and onroad vehicles. At this time, there is not anticipated to be any substantial use of equipment powered by electricity for construction or operations.

GHG emissions associated with changes in carbon sequestration due to land use changes have been addressed in a qualitative manner for wetlands, discussing some of the anticipated outcomes based on evolving scientific studies, and a quantitative manner for growth of riparian habitat, based on ARB's estimates for carbon sequestration.

8.3.2 Significance Criteria

GHG Construction Threshold

As discussed previously, the SJVAPCD has provided guidance for evaluating significance of GHG emissions that is intended to assist lead agencies in addressing GHG impacts for CEQA purposes, but the determination of significant impacts are ultimately within the purview of the lead agency. The SJVAPCD guidance on assessing significance relies on Best Performance Standards and demonstration of GHG reductions compared to business as usual conditions. Best Performance Standards have not been established for construction projects.

As lead agency under CEQA, the CSLC evaluates projects on a case-by-case basis when determining whether or not project GHG impacts are significant. For this project, the CSLC recommends that construction GHG emissions be amortized over the life of the project (assumed to be equivalent to the 49-year lease period), and compared to a quantitative significance threshold of 10,000 $MTCO_2e$ per year to determine the significance of project GHG impacts from construction. The CSLC developed this recommendation based on their consideration of several California Air Quality Management District (AQMD) and Air Pollution Control District (APCD) significance thresholds for large construction projects.[5]

For NEPA effects, the CEQ quantitative analysis trigger level of 25,000 $MTCO_2e$ per year is a useful indicator for long-term actions with annual emissions, but a methodology

[5] There is no specific value used for a significance threshold among different air districts. For example, the South Coast Air Quality Management District uses the 10,000 $MTCO_{2e}$ per year threshold for significance, but the SJVAPCD only specifies a zero equivalency value (which is much smaller). Also note that some agencies use their own values, for example the DWR climate action plan specifies a 25,000 $MTCO_{2e}$ per year threshold for construction.

to evaluate short-term construction emissions is not provided. Therefore, the methodology and significance threshold used to determine CEQA significance of construction GHG emissions is also used to determine NEPA effects in this analysis.

GHG Operational Threshold

The SJVAPCD guidance on assessing significance relies on Best Performance Standards and demonstration of GHG reductions compared to business as usual conditions. Best Performance Standards have not been established for operations and maintenance of restoration projects.

The SJVAPCD has adopted a Zero Equivalency Policy for Greenhouse Gases, which establishes a level below which GHG emissions are considered equivalent to zero for SJVAPCD permitting purposes. GHG emissions of 230 $MTCO_2e$ per year or less are considered to be zero for SJVAPCD permitting purposes. The SJVAPCD has not adopted this level as a significance threshold, but rather as an approved GHG emissions level that would be considered equivalent to zero.

To determine NEPA effects associated with project operations, the annual operational emissions will be compared to the CEQ quantitative analysis trigger level of 25,000 $MTCO_2e$ per year.

8.3.3 Impacts and Mitigation Measures

This section provides a Project-level evaluation of direct and indirect effects of the Project Alternatives on climate change and GHG emissions. It includes analyses of potential effects relative to No-Action conditions in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. The analysis is organized by Project alternative with specific impact topics numbered sequentially under each alternative. With respect to climate change and GHG emissions, the environmental impact issues and concerns are:

1. Impacts from GHG Emissions Associated with Project Construction.
2. Impacts from GHG Emissions Associated with Project Operation.
3. Changes in Land Use that Result in a Net Change in GHG Emissions.

The following analysis considers the Project's contribution to climate change and GHG emissions in the context of the cumulative condition. Other climate change and GHG emissions-related issues covered in the Program Environmental Impact Statement/Report (PEIS/R) (SJRRP 2011) are not covered here because they are programmatic in nature and/or are not relevant to the Project area.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the SJRRP would be implemented, including habitat restoration in other reaches, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these Program-level activities would not achieve Settlement goals. This section describes the impacts of the No-Action

Alternative. The analysis is a comparison to existing conditions, and no mitigation is required for No-Action.

Impact CC-1 (No-Action Alternative): *Impacts from GHG Emissions Associated with Project Construction*. Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed. Therefore there would be no GHG emissions associated with construction of the Project. There would be **no impact**.

Impact CC-2 (No-Action Alternative): *Impacts from GHG Emissions Associated with Project Operation*. Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed. Therefore there would be no GHG emissions associated with operation of the Project. There would be **no impact**.

Impact CC-3 (No-Action Alternative): *Changes in Land Use that Result in a Net Change in GHG Emissions*. Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed. There would be no Project-related land use changes. Therefore, there would be **no impact.**

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would include construction of Project facilities including a Compact Bypass channel, a levee system with a narrow floodplain encompassing the river channel, and the South Canal. Other key features include construction of the Mendota Pool dike (separating the San Joaquin River and Mendota Pool), a fish barrier below Mendota Dam, and the South Canal bifurcation structure with fish passage facility and fish screens, modification of the San Mateo Avenue crossing, and the removal of the San Joaquin River control structure of the Chowchilla Bifurcation Structure. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Impact CC-1 (Alternative A): *Impacts from GHG Emissions Associated with Project Construction*. Compared to No-Action, Alternative A would directly emit GHG emissions as a result of construction activities associated with the Project. These direct emissions from offroad construction equipment and onroad vehicles were quantified. (Full details of the methodology used to quantify emissions are contained in Chapter 4.0, "Air Quality." The construction offroad equipment schedule was provided by DWR.) GHG emissions associated with the operation of the equipment were estimated using statewide emission factors. Emissions associated with hauling of material to the Project area were estimated using EMFAC. Table 8-1 shows the GHG emissions associated with construction under each of the Action Alternatives.

As shown in Table 8-1, the amortized GHG emissions associated with construction of the Project is below the significance threshold of 10,000 $MTCO_2e$ per year under each alternative.

Furthermore, implementation of Mitigation Measures AQ-1A and AQ-1B to reduce criteria pollutant emissions from construction equipment and hauling trucks, respectively,

could result in GHG emission co-benefits and further reduce GHG emissions below significance thresholds. The potential magnitude of these co-benefits would be highly depend on the specific measures applied, as well as the extent to which these measures are applied (e.g., the percentage of the equipment and vehicle fleet mitigated). For example, the use of alternative fuels such as liquefied natural gas (LNG) or compressed natural gas (CNG) in material hauling trucks could reduce GHG emissions by up to 14 percent compared to diesel (see Tables 8-2 and 8-3). If this strategy was applied to all material hauling truck activity during construction, total GHG emissions could be reduced by up to approximately 65,200 $MTCO_2e$.

Implementation of Mitigation Measure AQ-1C may also result in GHG reduction co-benefits through the funding of emissions reductions programs through a voluntary emissions reduction agreement with SJVAPCD, although any potential GHG co-benefit would be dependent on the type of reduction programs funded. As such, there is not enough information to estimate the potential magnitude of GHG reduction co-benefits from implementing Mitigation Measure AQ-1C (if any).

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Therefore, impacts from construction GHG emissions under Alternative A would be **less than significant**.

Table 8-1.
Total Project GHG Emissions

Year	$MTCO_2e$ per Year			
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**
Year 1	9,955	10,034	9,955	10,034
Year 2	30,390	30,518	30,390	30,518
Year 3	29,853	29,500	29,853	29,500
Year 4	25,611	27,837	25,611	27,837
Year 5	24,818	34,530	15,294	26,833
Year 6	72,809	67,323	47,319	47,319
Year 7	73,411	67,310	47,245	47,245
Year 8	73,097	66,997	46,587	46,587
Year 9	72,538	67,211	45,343	45,343
Year 10	65,690	49,541	NA	NA
Total $MTCO_2e$ Emissions	478,172	450,801	297,597	311,216
$MTCO_2e$ Emissions Amortized over Project Lifetime ($MTCO_2e$ per Year)	9,759	9,200	6,073	6,351

Notes: Amortized emissions assume a project life of 49 years (based on a 49-year lease period).
GHG = greenhouse gases
$MTCO_2e$ = metric tons of carbon dioxide equivalents

Table 8-2.
GHG Emissions from Fuel Combustion in Vehicles

Fuel Type	Fossil Carbon Intensity (gCO2e/MJ)	Energy Economy Ratio Adjustment for Vehicle Efficiencies	Adjusted Percent Reduction in Carbon Intensity Compared to Diesel
Diesel	74.9	1	--
Liquefied Natural Gas (LNG)	58.5	0.9	-13%
Compressed Natural Gas (CNG)	57.73	0.9	-14%

Source: California Air Resources Board 2009a, 2009b, 2012

GHG = greenhouse gases

gCO2e/MJ = grams of carbon dioxide equivalent per megajoule

Table 8-3.
Potential GHG Reductions from Use of CNG Trucks

Alternative	Total MTCO2e for Truck Trips	MTCO2e Reduction
Alternative A	454,395	-65,251
Alternative B	427,924	-61,449
Alternative C	275,441	-39,553
Alternative D	288,500	-41,428

Key:

CO2e = carbon dioxide equivalents

GHG = greenhouse gases

CNG = compressed natural gas

$MTCO_2e$ = metric tons of carbon dioxide equivalents

Impact CC-2 (Alternative A): ***Impacts from GHG emissions Associated with Project Operation*****.** Compared to the No-Action, Alternative A would incur GHG emissions associated with routine maintenance and operations of the Project upon completion. Table 8-4 shows the GHG emissions associated with the operational phases of the Action Alternatives. The operational GHG emissions are less than 10 $MTCO_2e$ per year. These emissions are a conservative estimate because the GHG emissions in future years would decrease due to improvements in emissions from onroad vehicles. The operational GHG emissions under Alternative A would be below the CEQ analysis trigger level of 25,000 $MTCO_2e$ per year.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). The operational GHG emissions for Alternative A would be less than the zero equivalency level of 230 $MTCO_2e$ per year. Therefore, GHG emissions associated with Project operation for Alternative A would be **less than significant**.

Table 8-4.
Total Operational GHG Emissions

Alternative	$MTCO_2e$ per Year
Alternative A	5.21
Alternative B	5.21
Alternative C	5.21
Alternative D	5.02

Notes:
$MTCO_2e$ = metric tons of carbon dioxide equivalents
GHG = greenhouse gases

Impact CC-3 (Alternative A): ***Changes in Land Use that Result in a Net Change in GHG Emissions.*** Compared to the No-Action Alternative, the Project would create new floodplain areas within Reach 2B. In the area where levees are set back, there would be a change in land use from agriculture to riparian and wetland. Although wetlands can act as both a source and a sink for GHGs, growth of riparian habitat can increase carbon sequestration and reduce total GHG emissions.

Managed agriculture can be a major source of N_2O emissions, a highly potent GHG. Wetlands can be a source of methane, a potent GHG, but they also can sequester carbon. Whether wetlands are a net source or sink of GHG depends upon many factors including the time frame of interest and the characteristics of the wetland.

Altor and Mitsch (2006) looked at how intermittent versus continuous inundation of a wetland affected methane production. Their study concluded that intermittently flooded wetlands emitted significantly less methane than continuously flooded wetlands when the wetland was allowed to dry between flood events. Importantly, they observed that intermittently flooded wetlands emitted less methane when they were flooded then wetlands that are always flooded. In Reach 2B, most wetland areas are expected to be intermittently flooded and therefore may not be significant producers of methane. In addition, wetlands would become net sinks for carbon over the long term.

According to habitat restoration estimates, Alternative A could provide up to 100 acres of valley foothill riparian habitat, 200 acres of riparian scrub, and 390 acres of willow scrub in the Project area (SJRRP 2012, Attachment A). Assuming that new growth of riparian or shrub habitat can sequester approximately 44.3 $MTCO_2e$ per acre over the long-term (e.g., 100 years) (ARB 2014b), Alternative A could provide up to a 31,000 $MTCO_2e$ reduction. Wetland and riparian zones would likely result in a substantial decrease in GHG emissions relative to continued managed agriculture over the long term.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Therefore, compared to existing conditions, the Alternative A is expected to result in a **beneficial** effect.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B would include construction of Project features including a Compact Bypass channel, a levee system with a wide, consensus-based floodplain encompassing the river channel, and the Compact Bypass Bifurcation Structure with fish passage facility and fish screens. Other key features include construction of a fish passage facility at the San Joaquin River control structure of Chowchilla Bifurcation Structure, the re-route of Drive 10 ½ (across the Compact Bypass bifurcation structure), and removal of the San Mateo Avenue crossing. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Impact CC-1 (Alternative B): ***Impacts from GHG Emissions Associated with Project Construction*****.** Refer to Impact CC-1 (Alternative A). Potential construction impacts of Alternative B would be similar to the potential construction impacts of Alternative A except that the amortized GHG emissions associated with construction under Alternative B would be lower than Alternative A, as shown in Table 8-1. Construction GHG emissions under Alternative B would have a **less than significant** impact. Additionally, potential GHG emission reduction co-benefits from implementation of Mitigation Measures AQ-1A, AQ-1B, and AQ-1C would be similar to the potential co-benefits under Alternative A.

Impact CC-2 (Alternative B): ***Impacts from GHG emissions Associated with Project Operation*****.** Refer to Impact CC-2 (Alternative A). Potential operational impacts of Alternative B would be similar to the potential operational impacts of Alternative A. There would be a **less than significant** impact.

Impact CC-3 (Alternative B): ***Changes in Land Use that Result in a Net Change in GHG Emissions*****.** Refer to Impact CC-3 (Alternative A). Potential impacts of Alternative B would be similar to potential impacts of Alternative A. According to habitat restoration estimates, Alternative B could provide up to 340 acres of riparian scrub, 110 acres of valley foothill riparian habitat, and 500 acres of willow scrub in the Project area (SJRRP 2012, Attachment A). Assuming that new growth of riparian or shrub habitat can sequester approximately 44.3 MTCO2e per acre (ARB 2014b), Alternative B could provide up to a 42,000 MTCO2e reduction. This would result in a **beneficial** effect.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C would include construction of Project features including Fresno Slough Dam, a levee system with a narrow floodplain encompassing the river channel, and the Short Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the Short Canal control structure and fish screen, the Chowchilla Bifurcation Structure fish passage facility, modification of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Impact CC-1 (Alternative C): ***Impacts from GHG Emissions Associated with Project Construction*****.** Refer to Impact CC-1 (Alternative A). Potential construction impacts of Alternative C would be similar to the potential construction impacts of Alternative A

except that the amortized GHG emissions associated with construction under Alternative C would be lower than Alternative A, as shown in Table 8-1. Construction GHG emissions under Alternative C would have a **less than significant** impact. Additionally, potential GHG emission reduction co-benefits from implementation of Mitigation Measures AQ-1A, AQ-1B, and AQ-1C would be similar to the potential co-benefits under Alternative A.

Impact CC-2 (Alternative C): *Impacts from GHG emissions Associated with Project Operation*. Refer to Impact CC-2 (Alternative A). Potential operational impacts of Alternative C would be similar to the potential operational impacts of Alternative A. There would be a **less than significant** impact.

Impact CC-3 (Alternative C): *Changes in Land Use that Result in a Net Change in GHG Emissions*. Refer to Impact CC-3 (Alternative A). Potential impacts of Alternative C would be similar to potential impacts of Alternative A. According to habitat restoration estimates, Alternative C could provide up to 200 acres of riparian scrub, 100 acres of valley foothill riparian habitat, and 470 acres of willow scrub in the Project area (SJRRP 2012, Attachment A). Assuming that new growth of riparian or shrub habitat can sequester approximately 44.3 MTCO2e per acre (ARB 2014b), Alternative C could provide up to a 34,000 MTCO2e reduction. This would result in a **beneficial** effect.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D would include construction of Project features including Fresno Slough Dam, a levee system with a wide floodplain encompassing the river channel, and the North Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the North Canal bifurcation structure with fish passage facility and fish screens, removal of the San Joaquin River control structure of the Chowchilla Bifurcation Structure, removal of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Impact CC-1 (Alternative D): *Impacts from GHG Emissions Associated with Project Construction*. Refer to Impact CC-1 (Alternative A). Potential construction impacts of Alternative D would be similar to the potential construction impacts of Alternative A except that the amortized GHG emissions associated with construction under Alternative D would be lower than Alternative A, as shown in Table 8-1. Construction GHG emissions under Alternative D would have a **less than significant** impact. Additionally, potential GHG emission reduction co-benefits from implementation of Mitigation Measures AQ-1A, AQ-1B, and AQ-1C would be similar to the potential co-benefits under Alternative A.

Impact CC-2 (Alternative D): *Impacts from GHG emissions Associated with Project Operation*. Refer to Impact CC-2 (Alternative A). Potential impacts of Alternative D would be similar to potential impacts of Alternative A. There would be a **less than significant** impact.

Impact CC-3 (Alternative D): ***Changes in Land Use that Result in a Net Change in GHG Emissions*****.** Refer to Impact CC-3 (Alternative A). Potential impacts of Alternative D would be similar to potential impacts of Alternative A. According to habitat restoration estimates, Alternative D could provide up to 340 acres of riparian scrub, 110 acres of valley foothill riparian habitat, and 580 acres of willow scrub in the Project area (SJRRP 2012, Attachment A). Assuming that new growth of riparian or shrub habitat can sequester approximately 44.3 MTCO2e per acre (ARB 2014b), Alternative D could provide up to a 45,000 MTCO2e reduction. This would result in a **beneficial** effect.

9.0 Cultural Resources

This chapter describes the environmental and regulatory settings of cultural resources, as well as environmental consequences and mitigation, as they pertain to implementation of the Mendota Pool Bypass and Reach 2B Improvements Project (Project) alternatives. The discussion below includes descriptions of cultural resource conditions and the potential impacts of the Project alternatives on cultural resources for the area represented by the Project. The discussion in this section is supported by archaeological and historical architectural technical reports (Byrd et al. 2009) prepared for the Project, as well as for the Program Environmental Impact Statement/Report (PEIS/R) (SJRRP 2011), and the Native American ethnographic report (Davis-King 2009) prepared for the San Joaquin River Restoration Program (SJRRP). These reports are not publically available documents, as they contain confidential information on the location of sensitive cultural resources.

9.1 Environmental Setting

Cultural resources are defined as prehistoric and historic-era archaeological sites, Traditional Cultural Properties, Sites of Religious and Cultural Significance, and architectural properties (e.g., buildings, bridges, and structures). This definition includes historical properties as defined by the National Historic Preservation Act (NHPA). For the purposes of the discussion below, the term "Project area" refers to all areas that may be directly or indirectly affected by implementing Project actions. For the purposes of compliance with Section 106 of the NHPA, this area is identical to the "Area of Potential Effects" (APE).

A Programmatic Agreement (PA) is being developed among U.S. Department of the Interior, Bureau of Reclamation (Reclamation), the State Historic Preservation Office (SHPO) and consulting parties, including Native American Tribes, for compliance with Section 106 of the NHPA as it pertains to the Program. The PA would provide an overall framework for conducting the Section 106 process, including specific mitigation and review protocol, during the course of this Project as well as the entire SJRRP.

9.1.1 Regional Setting

The Project area lies within the central portion of the San Joaquin Valley, the southern extension of California's Great Central Valley. The source of the San Joaquin River is along the crest of the high Sierra Nevada, between Yosemite and Kings Canyon national parks. The river descends through high glacial valleys and then steep canyons before it enters the Central Valley north of Fresno. The San Joaquin River is the southernmost drainage that typically flows north to the Sacramento-San Joaquin Delta and San Francisco Bay. In wet years, the Kings River and even the Kern River overflow Tulare and Buena Vista lakes, respectively, and flow northward to join the San Joaquin.

Elevation within the Project area is approximately 150 feet near Mendota Pool where the San Joaquin River turns and beings flowing northward (Byrd et al. 2009).

Geology and Geomorphology

The central area and eastern side of the San Joaquin Valley is dominated by a complex intermingling of basin deposits that dominate the valley floor, and large alluvial fans that issue from the foothills of the Sierra Nevada and extend across the valley. This geomorphic contact is a geologically and seismically active area, and this activity has had a direct effect on surface geomorphology, deposition, and soils.

Due to the dynamic nature of California's landscape, archaeological sites deposited over approximately the last 13,500 years (roughly the time that humans are known to have lived in California) have been subject to numerous geomorphic processes. These processes have buried, destroyed, or left these sites intact on the surface. Within the San Joaquin Valley, geomorphic processes include response of alluvial fan deposition to changing climate, fluctuating river courses and related floodplain deposition, response of lakes (e.g., Tulare, Buena Vista) to climate, and response of the San Joaquin River to sea-level rise and upstream effects of the formation of the San Joaquin Delta. All of these factors have likely affected the differential preservation of archaeological sites on the surface, which hampers efforts to accurately assess the effects of the Project solely through archaeological reconnaissance surveys that are necessarily limited to investigation of the modern ground surface.

In general, most Pleistocene-age landforms have little potential for harboring buried archaeological resources, as they developed prior to human migration into North America (ca. 13,500 years before the present [B.P.]). However, Pleistocene surfaces buried below younger Holocene deposits do have a potential for containing archaeological deposits. Holocene alluvial deposits may contain buried soils (paleosols) that represent periods of landform stability before renewed deposition. The identification of paleosols within Holocene-age landforms is of particular interest because they represent formerly stable surfaces that have a potential for preserving archaeological deposits. See Section 18.1 on paleontological resources that may be present in the Project area, which are, conversely, primarily limited to Pleistocene or older landforms.

Vegetation

Extensive marshes once surrounded the lakes, sloughs, and rivers of the San Joaquin Valley. Before the historic period, their size varied seasonally and episodically, depending on larger environmental trends. Plants such as tules (*Scirpus lacustris*), growing as tall as 10 to 12 feet, covered the entire range of the wetlands. On drier ground, vegetation consisted of sagebrush (*Artemesia* species), greasewood (*Purshia tridentate*), saltbush (*Atriplex* species), and various bunchgrasses. Few trees inhabited the area except for along river channels, and included cottonwood (*Populus fremontii*), sycamore (*Platanus racemosa*), and willow (*Salix* species). Wildlife abounded in the lake and marshlands where large numbers of migratory ducks and geese joined thousands of year-round aquatic birds. Freshwater mussel (*Margaritifera margaritifera*), fish, and turtles were abundant, along with pronghorn antelope (*Antilocapra americana*), tule elk (*Cervus elaphus*), and winter herds of mule deer (*Odocoileus hemionus*). The area was also home

to plentiful numbers of rabbit (*Sylvilagus* species), black-tailed hare (*Lepus californicus*), and valley quail (*Lophortyx californica*) (Wallace 1978). The variety of wildlife in the San Joaquin Valley was typical for an area characterized by an arid to semi-arid climate, defined by hot summers and mild winters.

Cultural Setting

The following briefly discusses the archaeological record, the historical context, and the ethnographic context for the Project area. These contexts provide the basis for defining and ultimately evaluating any resources identified during the course of the investigation conducted for the purposes of this project.

Prehistoric Era

Prehistoric archaeological investigations have been limited within the San Joaquin River area of the Central Valley, and this area is considered by many to be one of the least understood regions in California with respect to prehistoric conditions (Moratto 1984, Riddell 2002, Rosenthal et al. 2007). As a result, archaeologists working in this area have been forced to borrow chronologies from nearby areas, particularly the foothills to the west (the eastern foothills of the Diablo Range) and to the east (the western slope of the Sierra Nevada) (Olsen and Payen 1969). These investigations of the western Sierra Nevada foothills have resulted in the formulation of local chronologies, notably the Chowchilla River/Buchanan Reservoir sequence.

Native American prehistoric occupation of the region began near the end of Pleistocene (circa 13,500 years ago) and continued until Spanish contact (in the late 1700s) (Rosenthal et al. 2007). Terminal Pleistocene (13,500 to 11,600 years ago) occupation in the region is represented by wide-ranging, mobile hunters and gatherers who periodically exploited large game. Throughout California, the prehistoric conditions of the Terminal Pleistocene are minimally represented and poorly understood. However, there is a probable Terminal Pleistocene site near Tulare Lake at the southern end of the Central Valley, and isolated artifacts dating to this era have been recovered within this area (Moratto 1984:81-82, Riddell and Olsen 1969).

Evidence of early Holocene (11,600 to 7,700 years ago) human settlement is only rarely encountered in the Central Valley (Rosenthal et al. 2007). Infrequent early Holocene sites in the foothills appear to have been seasonally occupied and include a robust ground stone assemblage focused on the processing of nuts. The lack of documented Central Valley early Holocene sites is undoubtedly due to sedimentation that has buried paleosurfaces of the time period (Rosenthal and Meyer 2004).

In the foothills, middle Holocene (7,700 to 3,800 years ago) sites are dominated by expedient cobble tools, likely used for various purposes including grinding, chopping, and pounding. Preserved plant remains from these sites are mainly represented by acorns and pine nuts. As with early Holocene sites, the relative lack of middle Holocene evidence in the Central Valley is due in large part to the archaeological record being buried by later sedimentation. Well-dated sites of this age in the Central Valley are typically discovered in buried contexts.

By 4,500 years ago, distinctive lowland and upland adaptive patterns emerged in the region (Rosenthal et al. 2007). Throughout the late Holocene (after 3,800 years ago) the Central Valley was characterized by a complex socioeconomic strategy focused on riverine and marsh resources and extremely elaborate material culture (Moratto 1984). Notable attributes included dart points, mortars and pestles; use of acorns and pine nuts; new fishing technologies and extensive exploitation of fisheries; basketry and cordage; ceramic items; diverse personal paraphernalia of stone, bone and shell; and large, formal cemetery areas.

Around 2,300 years ago, large populations began concentrating in major settlements along the San Joaquin River. Material culture included large dart points, mortars and pestles, milling stones, and bone spear points. Subsistence was concentrated on hunting and fishing and, based on secondary evidence, included hard seeds, with more limited use of acorns. Wide-ranging trade networks are documented and a non-egalitarian social organization and ascribed status may have emerged. With extended occupation at key settlements, large mounded villages were created. By approximately 1,000 years ago, population density had increased significantly, with noted developments in material culture including bow and arrow technology and new types of items of personal adornment.

Native Peoples at the Time of European Contact

At the time of contact with European settlers, the Project area was occupied by the Northern Valley Yokuts, who had lived in the region for some 4,500 years (Kroeber 1925; Latta 1977; Powers 1877; Wallace 1978). The Yokuts were hunter-gatherers who divided themselves into named tribes, each with a dialect, territory, and discrete settlements. Each tribe was politically autonomous and occupied a permanent area, usually on high ground along a major drainage course. The San Joaquin River and its main eastern tributaries formed the core of the Northern Valley Yokuts' homeland. Settlements west of the river tended to be in the foothills, concentrated along watercourses.

According to fragmentary information, the Yokuts exploited local subsistence resources from principal villages located on or near the San Joaquin River and other major streams (Cook 1955, 1960; Wallace 1978). Villages were composed of large, semisubterranean, round or oval dwellings. Some of the more major establishments also included larger communal dance houses. These villages were supported to a large extent by the riverine resources and by a variety of terrestrial plants, most importantly, oak trees for their acorns. Occupation was essentially sedentary, with dispersals occurring only seasonally for the acquisition of particular resources (Wallace 1978). Trade was focused along the river, where tule rafts were used for transportation. The Yokuts reportedly traded dogs to their Miwok neighbors in exchange for baskets and blankets. They acquired abalone and mussel shells from the coast and obsidian from the eastern slope of the Sierra Nevada.

Yokut populations at the time of Spanish contact have been estimated at about 41,000, with perhaps 5,000 living along the east side of the valley between the Merced and Kings rivers (Cook 1955). These numbers dropped drastically as native people here and throughout California were decimated by European and Euro-American diseases in the

early 19th century and by the tremendous influx of nonnative people during the local gold-mining period from the mid-19th and into the 20th centuries (Wallace 1978). Today there are still several bands of Yokuts Indians living in the San Joaquin Valley, though none are known to practice the traditional, pre-contact way of life.

Historic Era

For some time only sporadic interaction took place between Native Californians and Europeans (Beck and Haase 1974, Clough and Secrest 1984, Hayes 2007). The first Spanish expedition into the San Joaquin Valley was led by Pedro Fages in 1772 who sought a new route between San Diego and Monterey. In the 1820s, the objective of inland expeditions had changed from scouting new mission sites to punitive forays against the San Joaquin Valley Indians, both Yokuts and Miwoks. The Indians had engaged in sorties on missions, towns, and ranchos to steal livestock for food and transportation since the early 1800s. A cycle of raids and reprisals across the coastal mountains continued until American settlers took up permanent residence in the valley in the mid-1840s (Beck and Haase 1974, Broadbent 1974, Cook 1976).

While Mexican troops engaged in punitive expeditions against the San Joaquin Valley tribes, American trappers and explorers made their first journeys into the region. The first was Jedediah S. Smith in 1827. Other trappers from the Hudson's Bay Company passed through the Central Valley, as well as Kit Carson and Peter Ogden Skene. Perhaps the most famous explorer in the region at this time was John C. Fremont who was in the vicinity in 1844 (Clough and Secrest 1984, Fremont 1852, Smith 1977). Fremont also remarked on the abundance of wild horses on the west side of the San Joaquin River, and the difficulty of travel because of the swampy terrain and sloughs.

Two small Spanish settlements developed in the Project area near Fresno Slough in the early decades of the 1800s, called *Pueblo de Las Juntas* and *Rancho de los Californios* (California Ranch) (Clough and Secrest 1984, Wallace 1978). Officially sanctioned colonial settlement of the San Joaquin Valley began in the 1840s when the Mexican government issued its first land grants to individuals who petitioned for land. Two Mexican ranchos were successfully patented at the northwest end of the Project area on the west side of the San Joaquin River (Rancho Sanjon de Santa Rita and Orestimba Rancho), and a third claim in the foothills near Friant was rejected (Rancho Rio del San Joaquin).

In response to the gold rush, Americans quickly built a line of towns and roadside stations north and south across the 250-mile floor of the San Joaquin Valley, with Stockton as the central distributing point (Moehring 2004). The few towns in the Project area established during the second half of the nineteenth century all have their origins as favorable places to cross the San Joaquin River. A few were later sustained by agriculture or industry. For example, the settlement at the current site of Friant, on the San Joaquin River just below the Friant Dam, began as a ferry crossing on the San Joaquin River around 1854. Beginning in the early 20th century, gravel mining emerged as a major industry in the vicinity of Friant; several companies opened mines and the town benefitted economically. Boom times came with the construction of Friant Dam in the 1940s and gravel mines have continued to operate into recent years.

During the 1870s, the Central Pacific Railroad, and later the Southern Pacific Railroad, spawned a network of some 50 railroad stations, of which 24 became railroad town sites. About eight of these town sites became strategic trading centers stretching from Stockton south to Bakersfield; among them were towns in and near the Project area at Merced (1871), Sycamore (1872), and Fresno (1872). The modern day town of Herndon, about 10 miles northwest of downtown Fresno on the banks of the San Joaquin River, was originally known as Sycamore and had its start as a railroad station stop on Southern Pacific's rail line along the east side of the San Joaquin Valley. Other early settlements emerged in the Central Valley more as a consequence of the Stockton-Los Angeles Road and Butterfield Overland Stage Company line, which ran between the major urban centers of the state. For example, the town of Firebaugh to the north of the Project area on the San Joaquin River began in 1852 when a ferry was built at the site; it later had a toll road from the river crossing and a stage route also passed through Firebaugh.

Gold in the southern Sierra Nevada Foothills attracted the first large influx of settlers to what is now Madera, Merced, and Fresno counties beginning in 1849. Towns like Millerton, now under Millerton Lake, were established at this time. Soon thereafter, settlers began to occupy the eastern San Joaquin Valley in this area. These were luckless miners and newcomers who recognized the agricultural potential of the valley and the need for food in the mining camps. Numerous individuals purchased land and established ranches on the vast and largely vacant plains by the mid-1850s. Although private ranches of several hundred acres existed, much of the land was unreserved public domain and cattle grazed freely on an open range from the Sierra Nevada Foothills to the Coast Range.

Livestock ranching grew and prospered into the late 1860s. A large number of immigrants from the Ohio Valley and Missouri settled in the San Joaquin Valley during this era; many drove cattle with them across the plains from the Midwest. Along with their cattle, they brought with them the Anglo ranching traditions from the Midwest characterized by favoring European breeds, keeping fenced pastures, raising hay for winter feed, maintaining mixed herds of dairy cows and beef cattle, practicing selective breeding, and employing Anglo cowboys and ranch hands. Immigrants also established farms on the plains between the foothills and San Joaquin River lowlands where they primarily raised wheat during the 1860s and 1870s.

The need for water to irrigate the arid San Joaquin Valley became a priority for the economic development of Central Valley towns, especially those laid out along Southern Pacific's railroad track. In 1873, the California State Legislature passed a "No Fence Law," which established agriculture's dominance over ranching. By the late 1880s small-scale irrigated agriculture was in the ascendancy and irrigation companies, colonies, and districts were formed to help promote agriculture, for which the first canals were completed in the 1870s. Passage of the Wright Act in 1887 provided a legal mechanism for landowners to create public irrigation districts and finance major irrigation works to divert water from the major streams flowing west from the Sierra. Successful irrigation enterprises, including land colonies, in the Central Valley allowed specialty crop agriculture to flourish and redefined the region's economy (Tinkham 1923). While crops

such as grapes continued to be common in the early 20th century, the small farm tradition established by the agricultural colonies began to fade.

Early agriculture on the lower part of the Project area was dominated by the huge cattle ranching operation conducted by Henry Miller and Charles Lux. Miller and Lux developed massive ranching and farming operations on their property along the San Joaquin River (downstream from Mendota), including 140,000 acres in Madera County, more than 150,000 acres in Fresno County, and more than 250,000 acres in Merced County. Miller and Lux also became owners of a host of related subsidiary businesses, including stores, banks, hotels, irrigation systems, and public utilities. Miller and Lux were also pioneers in making use of a large-scale industrial labor force employed in a rural and agricultural setting.

Some of the oldest and most important irrigation works constructed within the Project area were built west of the San Joaquin River in 1871. The central unit of this vast canal and ditch system, constructed by Miller and Lux, was the so-called “Main Canal” of the San Joaquin and Kings River Canal and Irrigation Company. The Main Canal was the first canal built in Fresno County and one of the earliest large irrigation canals in California (W.W. Elliot and Co. 1882). The Main Canal was unique in that it required large amounts of capital and engineering skill, and irrigated thousands of acres. Its construction and success contributed to the 19th century agricultural development on the west side of the San Joaquin Valley (Jackson et al. 1990, Harding 1960, Pisani 1984). Miller and Lux also built the Dos Palos and Temple Slough canals by 1882 from the west bank of the San Joaquin. Over time, canals became increasingly important and extensive.

Irrigation districts started in California after passage of the Wright Act in 1887, which allowed for public tax-supported and democratically controlled irrigation districts. Progressive legislation passed in 1911 through 1913 increased State supervision over district organization and financing and made investing in irrigation district bonds more attractive. Demand for agriculture products also grew around this time and remained high throughout World War I. These conditions contributed to a flurry of district formation in California and to the formation of the Fresno Irrigation District and the Madera Irrigation District.

The Central Valley Project (CVP) was devised by the State, and ultimately built by the Federal government, to resolve California’s chronic water shortage problem. Studies undertaken between 1927 and 1931 resulted in a plan calling for a vast system of canals, massive dams, and reservoirs throughout the state, including most of what became the CVP (Hundley 1992). In 1935, Reclamation was charged with construction of the CVP, which was completed in the early 1950s (Hundley 1992). Reclamation designed the CVP as five fundamental units, operating as an integrated system: Shasta Dam, the Delta-Mendota Canal (DMC), Friant Dam, the Madera and Friant-Kern canals, and the Contra Costa Canal. The core of the system involved the coordinated operation of the other four units for the purpose of delivering Sacramento River water to the arid San Joaquin Valley.

Other water-related projects also flourished in the 20th century. These include the San Joaquin Hatchery, which is situated 1 mile below the Friant Dam, and extensive levee construction to minimize flooding. Major levee construction efforts to minimize flooding along the lower San Joaquin River were related to statewide flood control efforts. In 1913, with formation of the Sacramento and San Joaquin Drainage District, the San Joaquin River and its tributaries also came under jurisdiction of a Federal flood control plan (Bonte 1931). Flood control works on the San Joaquin River in the Project area did not begin to take shape until after World War II when the California State Reclamation Board began purchasing easements and rights-of-way for large overflow areas along the San Joaquin River. In 1955, the State created the Lower San Joaquin Levee District, which acted as a liaison with the U.S. Army Corps of Engineers, the California State Reclamation Board, and California Department of Water Resources (DWR) regarding construction of the Lower San Joaquin River Flood Control Project. Important aspects of the Lower San Joaquin River Flood Control Project include the Chowchilla Bypass, the Eastside Bypass, and the Mariposa Bypass, all of which were completed by 1966 (California State Reclamation Board 1966).

Throughout the historic era, transportation was an important focus of infrastructure development. Over time, foot travel and transportation by horse or stage coach gave way to river, railroad, and ultimately automobile travel. In the early decades of the 20th century the popularity of the automobile led to road improvements and a new State road building program. The main arterial along the eastside of the valley became the Golden State Highway in 1913 and then State Route 99.

9.1.2 Resources in the Project Area

The results presented below are adapted from the *Historic Properties Survey Report, Mendota Pool Bypass and Reach 2B Improvements Project* (Reclamation 2011).

Record Search and Surveys

To establish to what extent the Project footprint has been previously inventoried and what previously recorded resources exist within the areas that might be affected by the individual Project options and the alternatives for the Project, three record searches were conducted: November 2009 (RS#09-439), December 2009 (RS#09-479), and April 2010 (RS#10-173).

All of the literature searches were performed by the South San Joaquin Valley Information Center. The information center staff accessed the records for the Mendota, Firebaugh, and Tranquility U.S. Geological Survey 7.5-minute quadrangles, including a 1-mile radius around the Project footprint. The following references were also reviewed:

- National Register of Historic Places (NRHP) (2010).
- California Register of Historical Resources (CRHR) (2010).
- Office for Historic Preservation Historic Property Directory.
- California State Historical Landmarks (1996 and updates).
- California Inventory of Historic Resources (1976 and updates).

- California Points of Historical Interest (1992 and updates).
- California Department of Transportation's State and Local Bridge Survey (1986 and updates).
- Historical maps, including General Land Office Plat Maps.

In addition to the above references, the recently prepared sensitivity study for the entire SJRRP, *Cultural Resources Sensitivity Study and Research Design for the San Joaquin River Restoration Program, Fresno, Madera, Merced, and Stanislaus Counties, California* (Byrd et al. 2009), was also reviewed given its use in the preparation of the PEIS/R (SJRRP 2011) and its extensive information related to establishing the geoarchaeological[1] sensitivity and relevant cultural resource literature for the Project area.

Previous Survey Coverage

Each of the archaeological surveys reported by the Information Center, that are within or intersect the Project area, are small with respect to the actual acreage surveyed, and are all more than 5 years old, which tends to diminish their reliability (i.e., surveys greater than 5 years of age are typically viewed as dated and resurvey is required due to the potential for changed field conditions). The survey designation, year, and record search number are provided in Table 9-1. According to Byrd et al. (2009), only 6 percent of the area that represents Reach 2 has been previously surveyed. As a result, much of this region is not well known archaeologically.

In addition to the above reports, two recent studies have been conducted within the Project area. DWR prepared both reports in order to clear a proposed geotechnical analysis of potentially impacting unknown cultural resources. The surveys conducted in the vicinity of two of the proposed bore locations did identify cultural deposits potentially related to CA-FRE-45 and CA-FRE-106 (see below) (Gilbert 2011a; Gilbert 2011b). No additional evaluation of the deposits was conducted; however, all proposed geotechnical activities were moved to other locations to avoid potential impacts or effects to these deposits.

Table 9-1.
Previously Conducted Surveys within Project Area

Survey Designation	Year Accomplished	Records Search Number
FR 142	1997	RS#10-173
FR 148	1997	RS#09-439
FR 169	1969	RS#10-173
FR 265 (MA 108)	1998	RS#10-173
FR 388 (MA 897)	1980	RS#09-439
FR 775	1992	RS#09-439

[1] Geoarchaeology refers to the study of landscape change over time and the relative potential for archaeological sites to be either buried or destroyed by geomorphic processes.

Table 9-1.
Previously Conducted Surveys within Project Area

Survey Designation	Year Accomplished	Records Search Number
FR 2164	2004	RS#10-173
FR 2200	2005	RS#10-173
MA 48	1997	RS#10-173
MA 49	1997	RS#10-173
MA 116	1975	RS#09-439
MA 119 (FR 804)	1988	RS#10-173
MA 302	1982	RS#10-173
MA 331	1995	RS#10-173
MA 915	2002	RS#09-439

Key:
Survey Designation: FR= Fresno County; MA = Madera County
RS# = record search number;

Previously Recorded Cultural Resources

The previously recorded resources are tabulated in Table 9-2. Prior studies have led to the recording of six resources within the Project area. These include four archaeological sites, Mendota Dam, and a portion of Columbia Canal. Two of the known archaeological sites are located within the proposed river floodplain, one site is located within a potential borrow area, and one site is a generalized location approximately 2 square miles that has minimal overlap with the southeastern end of the Project area.

Table 9-2.
Previously Recorded Cultural Resources within Project Area

Site	Primary Number	Year Recorded	Site Type	Record Search Number
CA-FRE-45	P-10-000045	6/18/1939	Prehistoric	RS#10-173
CA-FRE-106	P-10-000106	2/1/1952	Prehistoric	RS#10-173
CA-FRE-563	P-10-000563	1/16/1975	Prehistoric	RS#09-439, RS#10-173
CA-MAD-301[1]	P-20-000301[1]	2/2/1975	Prehistoric	RS#09-439
Mendota Dam	P-10-003200	10/2/1997	Dam	RS#10-173
Columbia Canal	P-20-002383	12/11/2000	Canal	RS#09-439, RS#09-479

Notes:
[1] "Site" was recorded on the basis of hearsay; no field verification is represented in the site record.

With the exception of the Mendota Dam, the record searches did not identify any previously recorded resources that were previously determined eligible for the NRHP or CRHR. The prehistoric sites identified in the records search are predominantly old recordings of what were likely large habitation sites, but, even at the time of recordation, the majority of the site material had been heavily disturbed by some combination of development, farming, or alluvial processes.

Native American Communication

Information received from the Native American Heritage Commission on December 9, 2009, and December 23, 2009, indicates that no information pertaining to Native American cultural resources within the Project area was found in a review of the sacred lands file. The letters included a list of 14 individuals or organizations who should be contacted with regard to the proposed undertaking, and who may have information regarding cultural resources in the area. Letters were sent to each contact on November 30, 2010. One response has been received to date from Jerry Brown of the Chowchilla Tribe of Yokuts. Mr. Brown expressed interest in participating in any discussions regarding identified archaeological resources, if any.

Project-level Cultural Surveys

At the time of the cultural resources surveys in August 2010, access to privately owned property had been granted to only a portion of the Project area. Access had been granted primarily to parcels south of the San Joaquin River, and only limited access was available north of the river. The Project area represents about 5,360 acres. Due to the lack of access to much of the northern half of the Project area, as well as portions of the southern half, about 2,020 acres (38 percent) of the Project area has been subjected to survey to date. A team of four archaeologists conducted the survey using 20-meter transect intervals. Areas that were wet herbaceous habitat or seasonal wetland, especially within the North Loop oxbow (River Mile 207.7), were more cursorily surveyed due to a lack of surface visibility.

Archaeological Resources

With the exception of a single obsidian isolate, no archaeological resources were identified during the course of the surveys conducted for this EIS/R. The majority of the parcels were under some form of agriculture and therefore visibility of the surface varied from fair to good. The parcels were planted as orchards and vineyards, and consisted of riparian habitat along the banks of the river. None of the previously recorded prehistoric sites were relocated. In each case, the identified resource was described as almost destroyed or soon to be destroyed at the time of record. Furthermore, most of the sites were recorded over 40 years ago. Given the intensity of farming in the area, as well as a highly active riverine system nearby, an intact surface manifestation of cultural activity that was previously recorded is unlikely to have persisted to the present day. The isolated obsidian flake identified during field surveys for the current Project is likely a re-deposited artifact from one of the numerous sites located nearby and could lack any context to a known deposit or site.

Nevertheless, as indicated by Byrd et al. (2009) and SJRRP (2010), the potential for buried archaeological resources is high throughout the Project area. The alluvial environment near the San Joaquin River would generally have a high potential to contain buried archaeological sites. This is because large portions of the Central Valley are covered by Late Holocene landforms that include floodplain deposits laid down beginning about 4,000 years ago and continuing into the historic period. Even sites a few hundred years old may be buried (Gilbert 2011a, Byrd et al. 2009). Indeed, the subsurface analysis conducted by Gilbert (2011a; 2011b) suggested that at least two locations within

the Project area may contain intact subsurface deposits associated with the recorded locations of CA-FRA-45 and CA-FRA-106.

Architectural Resources

An historical architecture survey and evaluation program was conducted for the Project area in 2010 by JRP Historical; the following results are summarized from this report (SJRRP 2010). This survey has included a field check of all previously evaluated resources, and the SJRRP has prepared the appropriate recordation documents, either as an update or as a new Department of Parks and Recreation 523 form, to verify current conditions and previous evaluations.

Table 9-3 below summarizes the historical architectural findings for those resources identified within the Project area and list their status codes, which describe their eligibility to the NRHP and/or CRHR (SJRRP 2010). Of the 13 built environment resources identified within the Project area, five have been previously evaluated for the NRHP. None of the other eight newly identified resources were found to be eligible for the NRHP or CRHR.

The Mendota Dam was determined eligible for the NRHP and is listed in the CRHR. Constructed in 1917, the Mendota Dam is significant, presumably at the State level, under Criterion A, for its association with the Miller and Lux Company's irrigation works in the Central Valley. The DMC appears individually eligible for the National Register (and California Register) under Criterion A, presumably at the State level of significance, within the context of development, construction, and operation of the CVP. The period of significance was identified from 1945 to 1951, its period of construction. Both the Mendota Dam and DMC are considered historic resources under the California Environmental Quality Act (CEQA).

Table 9-3.
Property Status Under the National Register and California Register

Name/Address	Year Built	County	APN	OHP Status Code
Properties Determined Eligible or Previously Found to Appear Eligible for the National Register and California Register				
Mendota Dam	1917	Fresno; Madera	N/A	2S2
Delta-Mendota Canal	1946-1951	Fresno	N/A	3S
Properties Determined Not Eligible for the National Register or California Register				
Columbia Canal and Ridge Ditch	ca. 1880s; 1891-1924	Madera	N/A	6Z, 6Y
Main Canal	1872	Fresno	N/A	6Z, 6Y
Outside Canal	1900	Fresno	N/A	6Z, 6Y
Properties that Appear Not Eligible for the National Register or California Register as a Result of the Current Study				
643 North San Mateo Avenue	ca. 1962-1970s	Fresno	013-040-25S	6Z
San Joaquin River and Fresno Slough Levees	1947-1955	Fresno; Madera	N/A	6Z

Table 9-3.
Property Status Under the National Register and California Register

Name/Address	Year Built	County	APN	OHP Status Code
Mowry Canal	ca. 1910	Fresno	N/A	6Z
Mowry Ranch	ca. 1950-1968	Fresno	013-020-28	6Z
3614-3618 Bass Avenue	1961-1965	Fresno	013-020-40	6Z
Helm Ditch	ca. 1899-1913	Fresno	N/A	6Z
Bass Avenue	1957-1961	Fresno	013-020-14ST	6Z
Main Firebaugh Canal (Intake Canal)	1919-1929	Fresno	N/A	6Z

APN = assessor's parcel number
ca. = circa
OHP = Office for Historic Preservation
N/A = not applicable
Status Code 2S2 = Individual property determined eligible for National Register by a consensus through Section 106 process. Listed in the California Register.
Status Code 3S = Appears eligible for National Register as an individual property through survey evaluation.
Status Code 6Y = Determined ineligible for National Register by consensus through Section 106 process – Not evaluated for California Register or Local Listing.
Status Code 6Z = Found ineligible for National Register, California Register or Local designation through survey evaluation.

9.2 Regulatory Setting

Under Federal and State law, effects to significant cultural resources (e.g., archaeological remains, historic-period structures, and traditional cultural properties) must be considered as part of the environmental analysis of a proposed project. Criteria for defining significant cultural resources are included in 36 Code of Federal Regulations (CFR) Part 63 (Determinations of Eligibility for Inclusion in the NRHP); the NHPA of 1966, as amended (16 United States Code [USC] 470 et seq.); and CEQA. In addition, 36 CFR 800 outlines the compliance process for Section 106 of the NHPA.

9.2.1 Federal

National Historic Preservation Act (36 CFR Part 800 Implementing Regulations Section 106)

The NHPA of 1966 is the primary Federal legislation which outlines the Federal government's responsibility to cultural resources. More specifically, Section 106 of the NHPA and its implementing regulations located at 36 CFR Part 800, outline the Federal government's responsibility in identifying and evaluating cultural resources. Other applicable Federal cultural resources laws and regulations that could apply include, but are not limited to, the Native American Graves Protection and Repatriation Act, and the Archaeological Resources Protection Act.

Section 106 of the NHPA requires the Federal government to take into account the effects of an undertaking on cultural resources listed on or eligible for listing on the NRHP and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. Those resources that are on or eligible for inclusion in the NRHP are referred to as historic properties. The 36 CFR Part 800 regulations describe the Section 106 process. They outline the steps the Federal agency takes to identify cultural resources and the level of effect that the proposed undertaking will have on historic properties. An undertaking is defined as any "…project, activity or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including:

- Those carried out by or on behalf of the agency.
- Those carried out with federal assistance.
- Those requiring a federal permit, license, or approval.
- Those subject to state or local regulation administered pursuant to a delegation or approval by a Federal agency [Section 301(7) 16 USC 470w(7)]."

It is the initiating of an undertaking that begins the Section 106 process. Once an undertaking is initiated the Federal agency must first determine if the action is the type of action that has the potential to affect historic properties. If the action is the type of action that has the potential to affect historic properties, the Federal agency must: 1) identify the area APE, 2) determine if historic properties are present within that APE, 3) determine the effect that the undertaking will have on historic properties, and 4) consult with the SHPO to seek concurrence on Federal agencies findings. In addition, the Federal agency is required through the Section 106 process to consult with Indian Tribes concerning the identification of sites of religious or cultural significance, and to consult with individuals or groups who are entitled to be consulting parties or have requested to be consulting parties. If the undertaking will result in adverse effects to historic properties, these adverse effects must be resolved in consultation with the SHPO and other parties identified during the Section 106 process before the undertaking can proceed to implementation.

Historical significance is assessed by applying the NRHP criteria as defined by 36 CFR Part 60.4. Historic properties need to possess both historical significance and integrity to be considered eligible for inclusion in the NRHP. If a property has historical significance but does not retain sufficient integrity, the property will not be considered eligible for inclusion in the NRHP. Conversely, if a property has maintained a high degree of integrity but has no historical significance, then it will also not be considered a historic property.

NRHP guidelines describe historical significance as the "quality of significance in American history, architecture, archeology, engineering and culture" that is "present in districts, sites, buildings, structures, and objects." Properties eligible for the NRHP can be significant on a national, state, or local level and must meet at least one of the following historical significance criteria:

- Criterion A: Properties that are associated with events that have made a significant contribution to the broad patterns of our history.
- Criterion B: Properties that are associated with the lives of persons significant in our past.
- Criterion C: Properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D: Properties that have yielded or may be likely to yield, information important in prehistory or history.

Integrity is determined by applying the seven aspects of integrity to the historic resource: location, design, setting, materials, workmanship, feeling, and association. A resource will possess several, if not most, of the seven aspects of integrity to convey the historical significance of the resource.

Section 101(d)(6)(A) of the NHPA allows properties of traditional religious and cultural importance to a Native American tribe to be determined eligible for NRHP inclusion. In addition, a broader range of Traditional Cultural Properties are also considered and may be determined eligible for or listed in the NRHP. Traditional Cultural Properties are places associated with the cultural practices or beliefs of a living community that are rooted in that community's history may be eligible because of their association with cultural practices or beliefs of living communities that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. In the NRHP programs, "culture" is understood to mean the traditions, beliefs, practices, lifeways, arts, crafts, and social institutions of any community, be it an Indian tribe, a local ethnic group, or the nation as a whole.

Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act (25 USC § 3001 to 3013, 43 CFR Part 10) sets provisions for the removal and inadvertent discovery of human remains and other cultural items on Federal and tribal lands. The Native American Graves Protection and Repatriation Act clarifies the ownership of human remains and sets forth a process for repatriation of human remains and associated funerary objects and sacred religious objects to the Native American tribes or tribes likely to be lineal descendants or culturally affiliated with the discovered remains or objects.

Archaeological Resources Protection Act

The Archaeological Resources Protection Act (16 USC § 470aa-mm) sets forth requirements that must be met before Federal authorities can issue a permit to excavate or remove any archeological resource on Federal or Indian lands. The curation requirements of artifacts, other materials excavated or removed, and the records related to the artifacts and materials are also described.

Executive Order 13007 (Indian Sacred Sites) and April 29, 1994, Executive Memorandum

EO 13007 requires that Federal agencies with land management responsibilities accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners. This EO further requires that those agencies avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies also must maintain the confidentiality of sacred sites. Other requirements stipulate that the agencies provide reasonable notice of proposed actions or land management policies that may restrict future access to or ceremonial use of sacred sites, or that may adversely affect the physical integrity of sacred sites. The agencies must comply with the April 29, 1994, executive memorandum, "Government-to-Government Relations with Native American Tribal Governments."

Reclamation received information from Native American Heritage Commission about which Native American groups would be interested in Project actions. Reclamation mailed letters requesting their comments on November 30, 2010. Also, these Native American groups were notified of the public scoping meetings and are included in the distribution list for this EIS/R. Reaching out to Native American groups, including the groups that participated in scoping and review of this EIS/R, demonstrates that Reclamation has complied with EO 13007. If an Indian sacred site is encountered within the Project area, measures will be implemented to prevent any restriction of access or effect on the site's physical integrity. Continued compliance with this EO would be demonstrated through implementation of mitigation measures, as needed.

9.2.2 State of California

Under CEQA, the lead agency must consider potential effects to important or unique cultural resources. While the language is somewhat different between NHPA and CEQA, the definitions of eligible properties and of adverse impacts are essentially the same. Evaluations under CEQA consider a resource's potential eligibility for inclusion in the CRHR.

California Register of Historical Resources

California Public Resources Code section 5024.1 establishes the CRHR. The register lists all properties considered to be significant historical resources in the State. The CRHR includes all properties listed or determined eligible for listing on the NRHP, including properties evaluated under Section 106 of the NHPA. The criteria for listing are similar as those of the NRHP. CEQA section 21084.1 requires a finding of significance for substantial adverse changes to historical resources and defines the term "historical resources." CEQA section 21083.2 and State CEQA Guidelines section 15064.5, subdivision (c) provide further definitions and guidance for archaeological sites and their treatment.

California Native American Graves Protection and Repatriation Act

The California Native American Graves Protection and Repatriation Act (Health & Saf. Code, § 8010 et seq.) establishes a State repatriation policy intent that is consistent with and facilitates implementation of the Federal Native American Graves Protection and Repatriation Act. The act strives to ensure that all California Indian human remains and

cultural items are treated with dignity and respect, and encourages voluntary disclosure and return of remains and cultural items by publicly funded agencies in California.

Executive Order B-10-11

EO B-10-11 was signed by Governor Brown on September 9, 2011. This EO establishes the role and responsibilities of the Governor's Tribal Advisor and directs State agencies and departments under the Governor's executive control to communicate and consult with Federally recognized tribes, other California Native Americans, and representatives of tribal governments to provide meaningful input into the development of legislation, regulations, rules, and policies on matters that may affect tribal communities.

Assembly Bill 52

AB 52, signed on September 25, 2014, amends CEQA, creates a new category of environmental resources: "tribal cultural resources," and imposes new requirements for consultation for projects that may affect a tribal cultural resources (Public Resources Code sections 5097.94, 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2, and 21084.3).

9.2.3 Local and Regional

There are no known regional or local plans or policies related to cultural resources.

9.3 Environmental Consequences and Mitigation Measures

9.3.1 Impact Assessment Methodology

To assess impacts to cultural resources, historic properties and potential buried archaeological resources within the Project area were identified (see Section 9.1.4). A search for historic properties within the Project area was conducted (SJRRP 2010). This step was intended to provide a baseline for comparison to Project alternatives and to initiate the Section 106 process between Reclamation and SHPO. Cultural surveys were also conducted in the Project area using 20-meter transect intervals, where access to private- or publicly-owned property had been granted.

To assess impacts to identified cultural resources within the Project area, the construction and operation of the Project was evaluated relative to the identified historic properties and potential buried archaeological resources to determine the potential for adverse effects to those resources. For example, Project actions that require ground disturbance have the potential to cause adverse effects to archaeological resources and Project actions that cause physical destruction or visual setting alterations have the potential to cause adverse effects to the built environment.

9.3.2 Significance Criteria

Federal Criteria

National Environmental Policy Act

Pursuant to National Environmental Policy Act (NEPA) regulations (40 CFR 1500–1508), Project effects are evaluated based on the criteria of context and intensity. Context means the affected environment in which a proposed project occurs. The severity of the impact is examined in terms of the type, quality, and sensitivity of the resource involved; the location and extent of the impact; the duration of the impact (short- or long-term); and other considerations of context. Intensity means the degree or magnitude of a potential effect where the effect is determined to be negligible, moderate, or substantial.

Pursuant to NEPA, in considering whether an action may "significantly affect the quality of the human environment," an agency must consider, among other things, the unique characteristics of the geographic area such as proximity to historic or cultural resources (40 CFR 1508.27, subd. [b][3]), and the degree to which the action may adversely affect districts, sites, linear features, landscapes, buildings, structures, or objects listed, or eligible for listing, in the NRHP or may cause loss or destruction of significant scientific, cultural, or historical resources (40 CFR 1508.27 subd. [b][8]).

National Historic Preservation Act (16 USC Section 470 et seq.)

The NHPA establishes the Federal government policy on historic preservation and the programs including the NRHP, through which this policy is implemented. Under the NHPA, significant cultural resources, referred to as historic properties, include any prehistoric or historic district, site, building, structure, object, or landscape included in, or eligible for inclusion in, the NRHP. Historic properties also include resources determined to be National Historic Landmarks, which are nationally significant historic places designated by the Secretary of the Interior because they possess exceptional value or quality in illustrating or interpreting United States heritage. A property is considered historically significant if it meets one of the NRHP criteria and retains sufficient historic integrity to convey its significance. This act also established the Advisory Council on Historic Preservation, an independent agency responsible for implementing Section 106 of NHPA by developing procedures to protect cultural resources included in, or eligible for inclusion in, the NRHP. Regulations are published in 36 CFR Part 60 and 63, and 36 CFR Part 800.

Section 106 affords the Advisory Council on Historic Preservation and SHPO, as well as other consulting parties, a reasonable opportunity to comment on any undertaking that would adversely affect historic properties listed in or eligible for NRHP listing.[2] SHPO administers the national historic preservation program at the State level, review NRHP nominations, maintain data on historic properties that have been identified but not yet nominated, and consult with Federal agencies during Section 106 review.

[2] Mitigation required under Section 106 has the potential to bring significant impacts to less than significant levels for NEPA/CEQA.

The NRHP uses the National Register eligibility criteria (36 CFR 60.4) to evaluate significance. The criteria for evaluation are as follows:

- Properties that are associated with events that have made a significant contribution to the broad patterns of our history.
- Properties that are associated with the lives of persons significant to our past.
- Properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master; or that possess high artistic values; or that represent a significant and distinguishable entity whose components may lack individual distinction.
- Properties that have yielded, or may be likely to yield, information important in prehistory or history.

Section 101(d)(6)(A) of the NHPA allows properties of traditional religious and cultural importance to a Native American tribe to be determined eligible for NRHP inclusion. In addition, a broader range of Traditional Cultural Properties are also considered and may be determined eligible for or listed in the NRHP. Traditional Cultural Properties are places associated with the cultural practices or beliefs of a living community that are rooted in that community's history may be eligible because of their association with cultural practices or beliefs of living communities that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. In the NRHP programs, "culture" is understood to mean the traditions, beliefs, practices, lifeways, arts, crafts, and social institutions of any community, be it an Indian tribe, a local ethnic group, or the nation as a whole.

State Criteria

State CEQA Guidelines section 15064.5 provides specific guidance for determining the significance of impacts on historic and unique archaeological resources. Under CEQA, these resources are called historical resources whether they are of historic or prehistoric age. CEQA section 21084.1 defines historical resources as those listed, or eligible for listing, in the CRHR, or those listed in the historical register of a local jurisdiction (county or city). NRHP-listed historic properties located in California are considered historical resources for the purposes of CEQA and are also listed in the CRHR. The CRHR criteria for listing such resources are based on, and are very similar to, the NRHP criteria. CEQA section 21083.2 and State CEQA Guidelines section 15064.5, subdivision (c) provide further definitions and guidance for archaeological sites and their treatment. Section 15064.5 also prescribes a process and procedures for addressing the existence of, or probable likelihood, of Native American human remains, as well as the accidental discovery of any human remains within the Project area. This includes consultations with appropriate Native American tribes.

Guidelines for the implementation of CEQA define procedures, types of activities, persons, and public agencies required to comply with CEQA. CEQA section 21083.2 defines "unique archaeological resources" as "any archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
- It has a special and particular quality, such as being the oldest of its type or the best available example of its type.
- Is directly associated with a scientifically recognized important prehistoric or historic event."

CEQA section 21084.1 also further defines "adverse effect" on a historical resource as "a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment." CEQA defines substantial adverse change in the significance of a resource as the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the resource is materially impaired (State CEQA Guidelines, § 15064.5, subd. (b)(1)). The significance of a historical resource is considered to be materially impaired when a project demolishes or materially alters in an adverse manner those characteristics that convey its historical significance and that justify its inclusion on an historical resource list (State CEQA Guidelines, § 15064.5, subd. (b)(2)).

9.3.3 Impacts and Mitigation Measures

This section provides an evaluation of the long-term and temporary effects of the Project alternatives on cultural resources. It includes analyses of potential effects relative to No-Action conditions in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. With respect to cultural resources, the environmental impact issues and concerns are:

1. Effects on Archaeological Resources from Ground Disturbing Activities during Construction.
2. Effects on Historical Properties Listed or Eligible for Listing in the National or California Register.
3. Effects on Cultural Resources during the Operations and Maintenance Phase of the Project.

Other cultural-related issues covered in the PEIS/R are not covered here because they are programmatic in nature and/or are not relevant to the Project area. These issues include disturbance or destruction of cultural resources around Millerton Lake and disturbance or destruction of cultural resources along the San Joaquin River downstream from the Merced River.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the SJRRP would be implemented, including habitat restoration, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these Program-level activities would not achieve Settlement goals. The potential effects of the No-Action Alternative are described below.

The analysis is a comparison to existing conditions, and no mitigation is required for No-Action.

Impact CUL-1 (No-Action Alternative): *Effects on Archaeological Resources from Ground Disturbing Activities during Construction.* Similar to existing conditions, Project features would not be developed in the No-Action Alternative and therefore Project construction activities would not occur. There would be **no impact**.

Impact CUL-2 (No-Action Alternative): *Effects on Historical Properties Listed or Eligible for Listing in the National or California Register.* Mendota Dam was determined eligible for the NRHP and is listed in the CRHR, while DMC has been recommended as eligible to NRHP (see Section 9.1.2). Changes to Mendota Dam and the DMC as a result of the Project-level actions would not occur. There would be **no impact**.

Impact CUL-3 (No-Action Alternative): *Effects on Cultural Resources during the Operations and Maintenance Phase of the Project.* Under the No-Action Alternative, operations would continue similar to current operations and increased flows. Maximum channel conveyance would be limited to the existing capacity in Reach 2B. Therefore, there would be no new types of impacts to cultural resources (archaeological sites, historic-era structural resources, and traditional cultural properties/areas of concern). Archaeological sites within and immediately adjacent to the San Joaquin River would continue to be potentially impacted by Friant Dam releases and downstream diversions during ongoing operations under the No-Action Alternative. The scale of these events would continue to vary greatly interannually, with the most damage to resources occurring during occasional wet years with major flood events. Cultural resources outside of the existing levee alignment would continue to be potentially degraded by agricultural activities. This impact would be **potentially significant**. No mitigation is required for No-Action.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would entail construction of Project facilities including a Compact Bypass channel, a new levee system encompassing the river channel with a narrow floodplain, and the South Canal. Other key features include construction of the Mendota Pool Dike (separating the San Joaquin River and Mendota Pool), a fish barrier below Mendota Dam, and the South Canal bifurcation structure and fish passage facility, modification of the San Mateo Avenue crossing, and the removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Impact CUL-1 (Alternative A): *Effects on Archaeological Resources from Ground Disturbing Activities during Construction.* Compared to the No-Action Alternative, archaeological sites could be subject to adverse effects during construction activities under Alternative A. Soil excavation or compaction resulting from the use of heavy machinery on the construction site itself or in staging areas may affect the integrity of artifact-bearing deposits associated with known and as-yet undiscovered archaeological sites. Project alternatives entail a large amount of soil “borrowing” (as described in

Chapter 2, Section 2.2.4) from areas surrounding the San Joaquin River, which is a sensitive area for archaeological resources, particularly for buried deposits.

Adverse effects could occur to known archaeological resources as a result of ground disturbing activities, including soil borrowing. Cultural resources surveys conducted in the Project area prior to geotechnical activities have revealed buried cultural deposits at CA-FRA-45 and CA-FRA-106 (Gilbert 2011a; Gilbert 2011b). These deposits have not been evaluated for NRHP or CRHR eligibility. Additional buried elements could exist in these locations.

Adverse effects could also occur near the river channel. The alluvial deposits adjacent to the river are considered highly sensitive for buried archaeological resources. Unknown or unrecorded archaeological resources that are not observable when conducting standard surface archaeological inspection may exist within the Project area. Construction-related ground disturbance in areas that could contain unknown archaeological resources could cause substantial adverse changes in the significance of historical resources, unique archaeological resources, or historic properties. Currently about 38 percent of the Project area has been inventoried for archaeological resources. It is estimated that a large number of cultural resources would be documented within this reach after full inventory efforts (Byrd et al. 2009).

Compared to existing conditions, Alternative A would result in greater impacts to cultural resources as described in the preceding paragraphs. Construction of the Project could result in possible substantial effects on known or unknown archaeological deposits from ground-disturbing construction operations associated with the Project. This would cause substantial adverse changes in the significance of an archaeological resource pursuant to the NHPA (36 CFR Part 800) and is therefore considered an adverse effect under Section 106. Construction-related ground disturbance in areas that could contain unknown historical resources or properties could cause adverse changes in the significance of archaeological resources pursuant to State CEQA Guidelines section 15064.5. This impact would be **potentially significant**.

Mitigation Measure CUL-1A (Alternative A): *Comply with Section 106 of the NHPA or Equivalent.* Reclamation will comply with Section 106 of the NHPA during subsequent site-specific studies as access is granted to the large area of unsurveyed lands within the Project area for which permission to enter was not granted. Reclamation must comply with Public Resources Code sections 5024 and 5024.5, which require Federal agencies to confer with SHPO before implementing any project with the potential to affect historical resources listed in or potentially eligible for inclusion in the NRHP or registered as or eligible for registration as a State historical landmark.

Site-specific environmental reviews will be conducted before all ground-disturbing activities. The following mitigation measures, consisting of inventory, evaluation, and treatment processes, will be conducted by Reclamation as part of the environmental reviews to ensure compliance with Section 106 of the NHPA or Public Resources Code sections 5024 and 5024.5, as applicable. Coordination will continue with the relevant Native American tribes in the area, as necessary to complete these compliance processes.

Implementation Action: Inventory, evaluation, and treatment processes will be implemented during subsequent site-specific studies and as access is granted. These measures include conducting cultural resources surveys of portions of the Project area that have not been surveyed, planning activities to avoid known cultural resources, evaluating the significance of resources that cannot be avoided, and developing treatment process for significant resources.

- *Conduct cultural resources surveys of portions of the Project area that have not been surveyed.* Before any ground disturbance takes place in the Project area (including areas of ancillary activities, such as staging areas and access routes), cultural resource surveys covering the Project area will be conducted to locate and record cultural resources. Where appropriate, subsurface discovery efforts also will be undertaken to identify buried archaeological sites.
- *Plan activities to avoid known cultural resources.* Before carrying out ground-disturbing activities, areas that have been delineated as containing cultural resources will be demarcated, and all ground-disturbing or related activities will be planned to avoid these areas.
- *Evaluate significance of resources that cannot be avoided.* If cultural resources cannot be avoided through careful planning of the activities associated with the Project, additional research or test excavation (as appropriate) will be undertaken to determine whether the resources are significant.
- *Develop treatment process to mitigate effects of Project upon significant resources.* Impacts on significant resources that cannot be avoided will be mitigated in a manner that is deemed appropriate for the particular resource. Mitigation for significant resources may include, but are not limited to, data recovery, public interpretation, performance of a Historic American Building Survey or Historic American Engineering Record, or preservation by other means.

Location: In Project areas with subsequent site-specific studies and where additional access is granted.

Effectiveness Criteria: Successful compliance with Section 106 of the NHPA or Public Resources Code sections 5024 and 5024.5, as applicable.

Responsible Agency: Reclamation.

Monitoring/Reporting Action: Reclamation would report to SHPO and the consulting parties.

Timing: Site-specific environmental reviews will be conducted prior to ground-disturbing activities. Coordination will continue with the relevant Native American tribes in the area, as necessary to complete compliance processes.

Mitigation Measure CUL-1B (Alternative A): ***Conduct Subsurface Testing and/or Archaeological Monitoring in Proximity to Identified Sites or Areas of Sensitivity.*** Ground-disturbing activities that have the potential to affect archaeological resources may occur in areas that have been identified as either the location of a known archaeological site, or in as an area known to be sensitive for the presence of buried cultural resources. Implementation of the following measures would reduce potential impacts to known archaeological sites and areas of sensitivity.

Implementation Action: Prior to Project implementation, subsurface geoarchaeological testing will be conducted in areas where ground-disturbing construction activities are proposed in native sediments/soils near known archaeological resources, as well as any areas of proposed disturbance in areas identified by Byrd et al. (2009) as having high or very high sensitivity for buried archaeological resources, in order to rule-out the presence of buried archaeological resources within the Project's areas of subsurface disturbance. If subsurface testing is determined not to be feasible and/or the results of testing are inconclusive, an archaeological monitor approved by Reclamation and/or CSLC staff will be present during all ground-disturbing activities in those same areas described above.

In the event that cultural resources are exposed during construction, the monitor will be empowered to temporarily halt activities in the immediate vicinity of the discovery while it is evaluated for significance. If, in consultation with interested parties, it is determined that the cultural resources exposed are significant archaeological resources, and if Project activities cannot feasibly avoid the resource, additional measures will be implemented (see Mitigation Measures CUL-1C and CUL-1D below). Where necessary, Reclamation will seek Native American input and consultation.

Location: Construction areas with ground-disturbing activities occurring in native sediments/soils near known archaeological resources, as well as any areas of proposed disturbance in areas determined to be highly or very highly sensitive for buried archaeological resources by Byrd et al. (2009) or a subsequent Project-specific geoarchaeological sensitivity analysis.

Effectiveness Criteria: Performance tracking of this mitigation measure is based upon successful implementation and the approval of the documentation by SHPO and appropriate consulting parties.

Responsible Agency: Reclamation.

Monitoring/Reporting Action: Geoarchaeological testing will occur prior to, and/or archaeological monitoring will occur during, specified ground-disturbing activities. Reclamation will report to SHPO and the consulting parties.

Timing: Geoarchaeological testing will occur prior to ground disturbing activities. Active archaeological monitoring, as necessary, will occur throughout the duration of these specific ground-disturbing activities.

Mitigation Measure CUL-1C (Alternative A): *Halt Work in the Event of an Archaeological Discovery.* If any cultural resources are discovered during ground-disturbing activities, all work in the immediate vicinity of the resources will be halted, and an archaeologist approved by Reclamation and/or CSLC staff will assess the significance of the find. If the discovery is determined to be significant, work may proceed on other parts of the Project area while avoidance or mitigation alternatives are being developed and carried out.

Implementation Action: Reclamation will prepare and implement an Archaeological Treatment Plan, which will be developed in coordination with interested parties. This plan will include an approach for addressing unanticipated discoveries and will detail the specific procedures to be followed if archaeological materials are found during construction.

Reclamation will notify California State Lands Commission (CSLC) staff if the find is a cultural resource on lands under the jurisdiction of the CSLC. Reclamation will comply with all applicable rules and regulations promulgated by CSLC with respect to cultural resources in submerged lands.

If human remains are encountered, Reclamation will comply with applicable laws and regulations regarding notification and disposition of the remains. If the coroner determines that the remains are Native American, the coroner would notify the Native American Heritage Commission under Health and Safety Code section 7050.5 and Reclamation and/or CSLC staff would ensure that the discovery is treated in accordance with the provisions of Public Resources Code section 5097.98, subdivisions (a)-(d).

If any find is determined to be significant, Reclamation and/or CSLC staff, the Project archaeologist, and interested parties will determine the appropriate avoidance measures. All significant cultural materials recovered will be—as necessary and at the discretion of the Project archaeologist and with input from Native American representatives—subject to scientific analysis, professional museum curation,[3] and documentation according to current professional standards. In considering any suggested mitigation proposed to mitigate impacts on historic properties, historical resources, or unique archaeological resources, a determination will be made on whether avoidance is feasible in light of factors such as the nature of the find, Project design, costs, and other considerations.

[3] Curation is management and care of collections according to standard professional practice, which may include inventorying, accessing, labeling, cataloging, identifying, evaluating, documenting, storing, maintaining, periodically inspecting, and/or conserving original collections.

If, in consultation with interested parties, it is determined that a significant archaeological resource is present and that the resource could be adversely affected, one of the following actions may be followed, as feasible:

- If prudent and feasible, redesign the Project to avoid any adverse effect on the significant archaeological resource.
- Implement Mitigation Measure CUL-1D, Intentional Site Burial for Site Preservation.
- Implement an archaeological data recovery program (ADRP). If the circumstances warrant an ADRP, a data recovery program will be conducted. The scope of the ADRP will be determined together with the Project archaeologist and interested parties. The archaeologist will prepare a draft ADRP, which would identify the scientific/historical research questions that are applicable to the expected resource, the data classes the resource is expected to possess, and how the expected data classes would address the applicable research questions. Destructive data recovery methods will not be applied to portions of the archaeological resources not impacted by the Project.

Location: Active construction areas during ground-disturbing activities.

Effectiveness Criteria: Performance tracking of this mitigation measure will be based on successful implementation and approval of documentation by SHPO and appropriate consulting parties.

Responsible Agency: Reclamation and CSLC.

Monitoring/Reporting Action: Reclamation and/or CSLC staff will report to SHPO and the consulting parties.

Timing: Mitigation will be ongoing over the construction timeframe.

Mitigation Measure CUL-1D (Alternative A): *Plan an Intentional Site Burial Preservation in Place*. If Project engineering concludes that avoidance is not feasible, a process to determine whether the site can be preserved through intentional site burial will be considered. When complete avoidance is not possible, preservation-in-place is the preferred form of mitigation for a "historical resource of an archaeological nature" because it retains the relationships between artifact and context and may avoid conflicts with groups associated with the site, pursuant to Public Resources Code section 15126.4, subdivision (b)(3)(A). The process presented in overview here will be specified in detail in the Archaeological Treatment Plan.

Implementation Action: To intentionally bury a site, it will be necessary to conduct test excavations to determine the vertical and horizontal extent of the identified resources. If excavations have not yet been conducted for the purpose of evaluating the site for eligibility in accordance with section 106 of the NHPA, an archaeologist approved by Reclamation and/or CSLC staff will conduct a

formal excavation of the site to delineate the site boundaries and to determine the site's eligibility for the CRHR or NRHP.

If the site is found to be eligible or potentially eligible, and if avoidance is not feasible, then consideration will be given to intentional site burial. The Project archaeologist will, in consultation with interested parties, delineate the site boundaries, and prepare and implement a design plan to dictate the conditions of the intentional site burial according to the recommendations discussed in the National Park Service Technical Brief Number 5, *Intentional Site Burial: A Technique to Protect Against Natural or Mechanical Loss* (Thorne 1991).

Among the requirements of an effective capping design, the mechanical process of burying the site must be designed in a manner that ensures that the site matrix is protected during the placement process. Preconstruction testing can be used to determine the construction equipment and fill material load limits that are allowable without causing compression or warpage of the artifact and feature components of the site.

If the preconstruction testing determines that compression or warpage of the site is probable and that site capping would not reduce effects to less-than-significant levels, additional mitigation, such as data recovery, would be necessary. Furthermore, if it is determined that the engineering requirements of the Project at the location of the site prohibit the effective avoidance of the site or if the surrounding conditions prohibit the protection or preservation of the archaeological components, data recovery may be the only feasible mitigation (see Mitigation Measure CUL-1C, above). In addition, Reclamation and/or CSLC staff will make provisions to monitor the site after the burial process is complete.

Location: Active construction areas in the event of an archaeological discovery where avoidance is not feasible and capping can be designed to effectively minimize Project effects to the discovery.

Effectiveness Criteria: Performance tracking of this mitigation measure will be based on successful implementation and the approval of the documentation by SHPO and appropriate consulting parties.

Responsible Agency: Reclamation and CSLC.

Monitoring/Reporting Action: Reclamation and/or CSLC staff will make provisions with the archaeologist to monitor the site after the burial process is complete. Reclamation and/or CSLC staff will report to SHPO and the consulting parties.

Timing: Mitigation will occur in the event of an archaeological discovery where avoidance is not feasible and would be ongoing over the construction timeframe.

Mitigation Measure CUL-1E (Alternative A): ***Avoid Soil Borrowing in the Vicinity of Known Archaeological Resources.*** Reclamation will design the Project soil borrowing

activities to avoid adverse effect on known archaeological resources, to the extent feasible. Known archaeological resources will be delineated and avoided during construction. Mitigation Measures CUL-1B, CUL-1C, and CUL-1D will also be implemented, as needed.

> **Implementation Action:** If feasible, Reclamation will design the Project soil borrowing activities to avoid any adverse effect on known archaeological resources, such as CA-FRA-45 and CA-FRA-106, both of which are considered potentially significant historical resources. (Mitigation Measures CUL-1B, CUL-1C, and CUL-1D will also be implemented, as needed.) At least 90-days prior to proposed borrowing activities, an archaeologist approved by Reclamation and/or CSLC staff will determine the extent of known resource near borrow areas through a presence or absence testing program using augers or test pits. The Project archaeologist will then cordon the site boundaries in a manner that restricts construction equipment or personnel from entering the site.
>
> **Location:** Within the vicinity of known archaeological resources, including CA-FRA-45 and CA-FRA-106.
>
> **Effectiveness Criteria:** Avoidance of areas within delineated site boundaries.
>
> **Responsible Agency:** Reclamation and CSLC.
>
> **Monitoring/Reporting Action:** Reclamation and/or CSLC staff will report to SHPO and the consulting parties.
>
> **Timing:** At least 90-days prior to proposed borrowing activities.

Implementation of Mitigation Measures CUL-1A, CUL-1B, CUL-1C, CUL-1D, and CUL-1E would decrease impacts on archaeological resources. Impacts after mitigation would be **less than significant** for Alternative A.

Impact CUL-2 (Alternative A): *Effects on Historic Properties Listed or Eligible for Listing in the National or California Register.* Under Alternative A, Mendota Dam and the DMC would not be modified by Project construction activities. Operations of Mendota Dam and DMC would be similar to the No-Action Alternative because these facilities are operated to make water deliveries which would not be affected by Alternative A.

Compared to existing conditions, these historic properties would remain unchanged. This alternative would have **no impact** to historic properties or historical resources of the built environment (architectural resources) that are listed or eligible for listing in the National or California Register.

Impact CUL-3 (Alternative A): *Effects on Cultural Resources during the Operations and Maintenance Phase of the Project.* Compared to the No-Action Alternative, the increased channel conveyance capacity, increased floodplain area, and floodplain and channel grading associated with Alternative A, in combination with flood flows and

Restoration Flows, could allow opportunities for new impacts to cultural resources (archaeological sites, historic-era structural resources, and traditional cultural properties/areas of concern). Alternative A would include a new levee system encompassing the river channel and additional floodplain areas that would typically have been disturbed by prior agricultural activities. Although there is a potential for increased erosion on the floodplain due to flood flows and Restoration Flows, velocities would decrease as water inundates more of the floodplain. Highly erodible areas would be reinforced by the Project (such as areas below concrete structures and at river bends) and water velocities and erosional forces are expected to be negligible in areas away from the main channel. Therefore, flood flows and Restoration Flows would not cause significant impacts to cultural resources in previously undisturbed areas that are located on the floodplain and outside of the main channel. Archaeological sites within and adjacent to the San Joaquin River would continue to be exposed to Friant Dam releases during ongoing operations, but higher flows would be distributed over the floodplain.

When comparing Alternative A to existing conditions, impacts to cultural resources on the floodplain would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). This impact would be **less than significant**.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Key features of Alternative B include construction of a new levee system to establish a bypass channel to northeast of the existing river channel, Compact Bypass Bifurcation Structure, Mendota Pool Control Structure, and re-route of Drive 10 ½. No construction activities are proposed at or near Mendota Dam, which falls outside the Project boundary under Alternative B. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Impact CUL-1 (Alternative B): ***Effects on Archaeological Resources from Ground Disturbing Activities during Construction.*** Refer to Impact CUL-1 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. This impact would be **potentially significant**.

Mitigation Measures CUL-1A, CUL-1B, CUL-1C, CUL-1D, and CUL-1E (Alternative B): ***Comply with Section 106 of the NHPA or Equivalent, Conduct Archaeological Monitoring in Proximity to Identified Sites or Areas of Sensitivity, Halt Work in the Event of an Archaeological Discovery, Plan an Intentional Site Burial Preservation in Place,*** **and** ***Avoid Soil Borrowing in the Vicinity of Known Archaeological Resources.*** Refer to Mitigation Measures CUL-1A, CUL-1B, CUL-1C, CUL-1D, and CUL-1E (Alternative A). The same measures would be used here. This impact would be **less than significant** after mitigation.

Impact CUL-2 (Alternative B): ***Effects to Historical Properties Listed or Eligible for Listing in the National or California Register.*** Refer to Impact CUL-3 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. There would be **no impact**.

Impact CUL-3 (Alternative B): ***Effects on Cultural Resources during the Operations and Maintenance Phase of the Project.*** Refer to Impact CUL-4 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. This impact would be **less than significant**.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Key features of Alternative C include construction of new fish passage facilities at Mendota Dam, grade control structures downstream of Mendota Dam, a new Fresno Slough Dam, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Impact CUL-1 (Alternative C): ***Effects on Archaeological Resources from Ground Disturbing Activities during Construction.*** Refer to Impact CUL-1 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A. This impact would be **potentially significant**.

Mitigation Measures CUL-1A, CUL-1B, CUL-1C, CUL-1D, and CUL-1E (Alternative C): ***Comply with Section 106 of the NHPA or Equivalent, Conduct Archaeological Monitoring in Proximity to Identified Sites or Areas of Sensitivity, Halt Work in the Event of an Archaeological Discovery, Plan an Intentional Site Burial Preservation in Place,*** **and** ***Avoid Soil Borrowing, or other Ground Disturbing Activity in the Vicinity of Known Archaeological Resources.*** Refer to Mitigation Measures CUL-1A, CUL-1B, CUL-1C, CUL-1D, and CUL-1E (Alternative A). The same measures would be used here. This impact would be **less than significant** after mitigation.

Impact CUL-2 (Alternative C): ***Effects to Historical Properties Listed or Eligible for Listing in the National or California Register.*** In comparison to the No-Action Alternative, Alternative C would include construction of a fish ladder at Mendota Dam and modification in Mendota Dam operations. This would cause physical changes to the Mendota Dam due to the addition of a fish ladder. Alternative C would also cause a small realignment to a section of the DMC where it transitions into Mendota Pool. An inlet canal is proposed at this transition location that would take water from the upstream side of the proposed Fresno Slough Dam, run north adjacent to the west side of the San Joaquin River, and connect to the Main Canal and Helm Ditch just west of their current intakes. This would cause only a minor physical change to the DMC. Because this alternative proposes physical changes to the Mendota Dam, which is eligible for listing as a historic property under Section 106 and is a historical resource listed in the California Register, a substantial adverse change or adverse effect could occur to this resource.

While the physical alterations of Mendota Dam required for the Project may not destroy the resource, it may change the resource such that it would no longer convey its significance; hence, this would be considered a substantial adverse change to the resource. While the significance of the resources is more related to its association with early irrigation public works in the Central Valley, rather than its architectural distinction, the alterations proposed may diminish the capacity of the resource to resemble its historic period of significance.

When comparing Alternative C to existing conditions, impacts to architectural resources would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative C to the No-Action Alternative). This would be a **potentially significant** impact.

Mitigation Measure CUL-2 (Alternative C): ***Follow the Secretary of the Interior's Standards for the Treatment of Historic Properties.*** Alterations to historical buildings or structures will conform to the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (Weeks and Grimmer 1995). Where new structures are required as elements of improved fish passage, such as the new proposed fish ladder at Mendota Dam, designs that are compatible with the overall character of the historic property are preferred. This includes the continuation of the existing character through the use of materials as well as consistent use of color and placement which reduces overall visual effects. This mitigation measure would reduce impacts on significant historical buildings and structures to a **less-than-significant** level.

> **Implementation Action:** Alterations to historical buildings or structures would conform to the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (Weeks and Grimmer 1995).
>
> **Location:** Construction activities at Mendota Dam.
>
> **Effectiveness Criteria:** Secretary of the Interior's Standards are met.
>
> **Responsible Agency:** Reclamation and CSLC.
>
> **Monitoring/Reporting Action:** Reclamation and/or CSLC staff will report to SHPO and the consulting parties.
>
> **Timing:** Prior to and during construction activities at Mendota Dam.

Impact CUL-3 (Alternative C): ***Effects on Cultural Resources during the Operations and Maintenance Phase of the Project.*** Refer to Impact CUL-4 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A. This impact would be **less than significant**.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Key features of Alternative D include construction of new fish passage facilities at Mendota Dam, grade control structures downstream of Mendota Dam, Fresno Slough Dam, Main Canal and Helm Ditch relocations, and the North Canal. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Impact CUL-1 (Alternative D): ***Effects on Archaeological Resources from Ground Disturbing Activities during Construction.*** Refer to Impact CUL-1 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A. This impact would be **potentially significant**.

Mitigation Measures CUL-1A, CUL-1B, CUL-1C, CUL-1D, and CUL-1E (Alternative D): ***Comply with Section 106 of the NHPA or Equivalent, Conduct Archaeological Monitoring in Proximity to Identified Sites or Areas of Sensitivity, Halt Work in the Event of an Archaeological Discovery, Plan an Intentional Site Burial Preservation in Place,*** **and** ***Avoid Soil Borrowing, or other Ground Disturbing Activity in the Vicinity of Known Archaeological Resources.*** Refer to Mitigation Measures CUL-1A, CUL-1B, CUL-1C, CUL-1D, and CUL-1E (Alternative A). The same measures would be used here. This impact would be **less than significant** after mitigation.

Impact CUL-2 (Alternative D): ***Effects to Historical Properties Listed or Eligible for Listing in the National or California Register.*** Refer to Impact CUL-3 (Alternative C). Because this alternative proposes changes to the Mendota Dam, a historic property under Section 106 and a historical resource listed in the California Register, this may cause substantial adverse change or adverse effects to this resource. This impact would be **potentially significant**.

Mitigation Measure CUL-2 (Alternative D): ***Follow the Secretary of the Interior's Standards for the Treatment of Historic Properties.*** Refer to Mitigation Measure CUL-2 (Alternative C). The same measure would be used here. This impact would be **less than significant** after mitigation.

Impact CUL-3 (Alternative D): ***Effects on Cultural Resources during the Operations and Maintenance Phase of the Project.*** Refer to Impact CUL-4 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A. This impact would be **less than significant**.

10.0 Environmental Justice

Environmental justice is generally defined as:

> *"The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies" (U.S. Department of Energy 1997).*

The purpose of the environmental justice analysis is to determine whether disproportionately high and adverse environmental and economic effects would be realized by minority and/or low-income populations with implementation of projects, programs, or policies. To facilitate this analysis, information on the demographic and social characteristics of the population in the Project area has been collected to determine the extent to which minority and/or low-income populations exist in the region. This information is presented in Section 10.1. Section 10.2 presents the regulatory setting applicable to environmental justice. In Section 10.3, the anticipated environmental and socioeconomic impacts of the Project are assessed in the context of environmental justice populations of concern.

10.1 Environmental Setting

This section describes the demographic and socioeconomic characteristics of populations potentially affected by the Project, which serve as the foundation of the environmental justice analysis. The geographic area considered for the environmental justice analysis covers the two counties within which Reach 2B is located (i.e., Fresno and Madera counties, hereinafter referred to as the two-county region). It also includes the three census tracts (CT) in proximity to Reach 2B (i.e., CT 39, CT 83.01, and CT 4). The location of these census tracts are shown on Figure 10-1.

Environmental justice focuses on minority and low-income populations, and therefore topics addressed include race and ethnicity and relevant economic indicators of social well-being, including income and poverty. In addition, based on the strong connection between the Project area and the agricultural industry, information on these environmental justice parameters is also presented for local agricultural workforce.

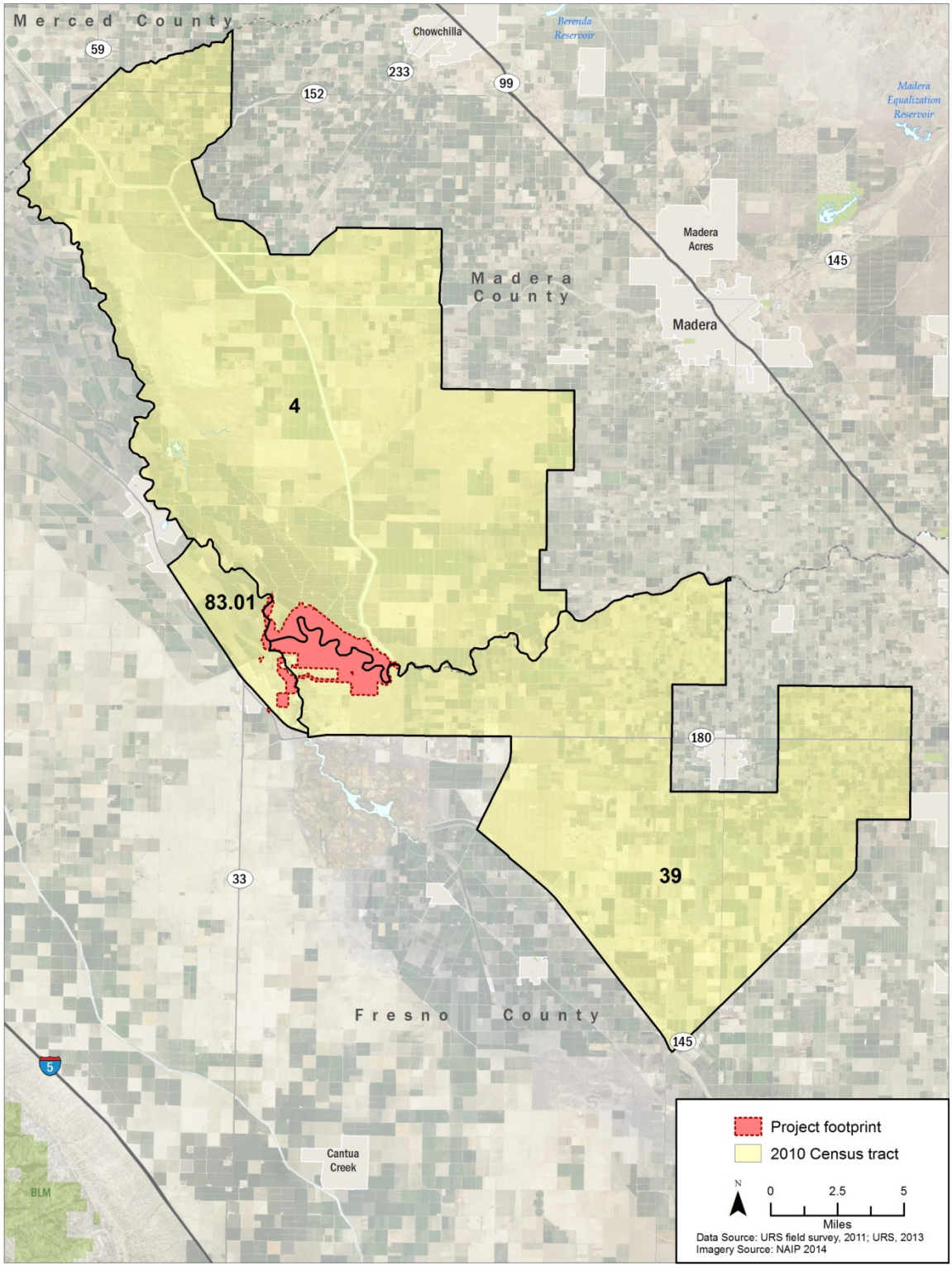

Figure 10-1.
Census Tracts near Reach 2B

The social and demographic characteristics of the Project area were evaluated to determine if any environmental justice communities of concern exist locally. This is determined based on the comparison of select social and demographic parameters for the Project area relative to the State, which serves as the reference population. If the minority or low-income populations are "meaningfully greater" in the region relative to this reference population, or where the proportion exceeds 50 percent of the total population, then an environmental justice community of concern is assumed to be present.

10.1.1 Social and Demographic Characteristics

Race and Ethnicity (Minority Populations)

The Council on Environmental Quality (CEQ 1997) defines a minority as persons who identify themselves as *Black/African American*, *Asian*, *Native Hawaiian or Other Pacific Islander*, and *American Indian or Alaska Native*. For the purposes of this analysis, the definition of minority also extends to other nonwhite categories of race, which include *Some Other Race* and *Two or More Races*. The CEQ guidance also identifies persons of *Hispanic* ethnicity, regardless of race, as part of minority populations (CEQ 1997). Hispanic origin is considered to be an ethnic category separate from race, according to the U.S. Census. These definitions apply here even though the minority populations within the State when combined are greater than 50 percent (as shown in Table 10-1 below).

Table 10-1 displays the potentially affected minority groups within the Project area based on the most recent decennial census data from the U.S. Census Bureau. The category "total minority" includes all residents except non-Hispanic whites, who are not considered minorities. As shown, the State and both Fresno and Madera counties have a minority population exceeding 50 percent. Together, the two-county region contains a minority population of 66.5 percent. The three CTs within the Project area also exceed 50 percent, with a joint minority population of 83.3 percent. In fact, CT 83.01 in Fresno County has an exceptionally high proportion of minorities (97.7 percent). Further, the CTs and two-county region both have a higher minority population compared to the State. These data suggest that the Project area and vicinity is considered an environmental justice community of concern from the perspective of race and ethnicity.

Table 10-2 presents the racial and ethnic composition of farm operators within the two-county region and State based on the most recent census of agriculture from the U.S. Department of Agriculture. Information on the race and ethnicity of farm operators at the CT level is not available. The farm operator is the person who runs the farm, making the day-to-day management decisions. The operator could be an owner, hired manager, cash tenant, share tenant, and/or a partner. As shown, the majority of farm operators in the two-county region are white (69.3 percent), which is representative of patterns in the State as a whole. There are slightly higher proportions of farm operators identifying as Asian and Hispanics in the two-county region compared to the State.

Table 10-1.
Race and Ethnicity of Local Population, 2010

Geo-graphic Area	Total Population	Race							Hispanic Origin		Total Minority [b]
		White	Black or African-American	American Indian	Asian	Native Hawaiian/ Pacific Islander	Some Other Race	Two or More Races	White Alone, Non-Hispanic	All Races, Hispanic [a]	
Fresno County	930,450	515,145	49,523	15,649	89,357	1,405	217,085	42,286	304,522	468,070	625,928
	100.0%	55.4%	5.3%	1.7%	9.6%	0.2%	23.3%	4.5%	32.7%	50.3%	67.3%
CT 39	5,804	3,257	26	209	94	0	2,005	213	1,633	4,008	4,171
	100.0%	56.1%	0.4%	3.6%	1.6%	0.0%	34.5%	3.7%	28.1%	69.1%	71.9%
CT 83.01	5,989	3,028	58	71	55	5	2,572	200	140	5,782	5,849
	100.0%	50.6%	1.0%	1.2%	0.9%	0.1%	42.9%	3.3%	2.3%	96.5%	97.7%
Madera County	150,865	94,456	5,629	4,136	2,802	162	37,380	6,300	57,380	80,992	93,485
	100.0%	62.6%	3.7%	2.7%	1.9%	0.1%	24.8%	4.2%	38.0%	53.7%	62.0%
CT 4	1,288	798	11	12	4	1	412	50	412	851	876
	100.0%	61.8%	0.6%	1.1%	2.2%	0.4%	29.1%	4.9%	38.7%	56.6%	61.3%
Total CT's	13,081	7,083	95	292	153	6	4,989	463	2,185	10,641	10,896
	100.0%	54.1%	0.7%	2.2%	1.2%	0.0%	38.1%	3.5%	16.7%	81.3%	83.3%
Two-County Region	1,081,315	609,601	55,152	19,785	92,159	1,567	254,465	48,586	361,902	549,062	719,413
	100.0%	56.4%	5.1%	1.8%	8.5%	0.1%	23.5%	4.5%	33.5%	50.8%	66.5%
State	37,253,956	21,453,934	2,299,072	362,801	4,861,007	144,386	6,317,372	1,815,384	14,956,253	14,013,719	22,297,703
	100.0%	57.6%	6.2%	1.0%	13.0%	0.4%	17.0%	4.9%	40.1%	37.6%	59.9%

Source: U.S. Census Bureau 2010

Notes:

[a] The term "Hispanic" is an ethnic category and can apply to members of any race, including respondents who self-identified as "white." The total numbers of Hispanic residents for each geographic region are tabulated separately from the racial distribution by the U.S. Census Bureau. Hispanic information is taken from U.S. Census Bureau 2010, while data regarding race are taken from U.S. Census Bureau 2010, Table P7.

[b] "Total minority" is the aggregation of all non-white racial groups with the addition of all Hispanics, regardless of race. Total minority information is taken from U.S. Census Bureau 2010, with the total for "Not Hispanic or Latino: White alone" subtracted from the total population.

Key: % = percent, CT = Census Tract

Table 10-2.
Race and Ethnicity of Farm Operators, 2012

Geo-graphic Area	Total Farm Operators	White	Black or African-American	American Indian	Asian	Native Hawaiian / Pacific Islander	More Than One Race	All Race, Hispanic
Fresno County	10,378	6,964	52	140	1,499	36	71	1,616
	100.0%	67.1%	0.5%	1.3%	14.4%	0.3%	0.7%	15.6%
Madera County	2,715	2,106	15	24	234	8	8	320
	100.0%	77.6%	N/A	0.9%	8.6%	0.3%	0.3%	11.8%
Two-county Region	13,093	9,070	67	164	1,733	44	79	1,936
	100.0%	69.3%	0.5%	1.3%	13.2%	0.3%	0.6%	14.8%
California	137,510	111,141	526	1,761	7,474	455	1,030	15,123
	100.0%	80.8%	0.4%	1.3%	5.4%	0.3%	0.7%	11.0%

Source: USDA 2014, Census of Agriculture

Notes:

"Total Minority" cannot be computed from the data provided by the U.S. Department of Agriculture (USDA) Agricultural Census, as a tabulation of "White Alone, Non-Hispanic" farm operators is not provided.

Key:

% = percent

USDA = U.S. Department of Agriculture

Table 10-3 presents the racial and ethnic composition of laborers and helpers within the Project area based on the most recent Equal Employment Opportunity Tabulation data from the U.S. Census. Information on the race and ethnicity of laborers and helpers at the CT level is not available. The category "laborers and helpers" generally includes farm laborers, but may also include other manual labor sectors as part of the total. This category excludes construction personnel, which are captured under a different category by the U.S. Census Bureau. As shown, Hispanics comprise the largest proportion of laborers in each geographic area. The proportion of Hispanic laborers and helpers in the two-county region (86.4 percent) is higher to that in the State (71.3 percent). A similar pattern is found when evaluating all minority groups. The proportion of total minorities in this component of the workforce is 90.9 percent in the two-county region compared to 80.8 percent in the State.

Socioeconomic Indicators of Well-Being (Low-Income Populations)

For this analysis, persons with income below the poverty threshold established by the U.S. Census Bureau are considered low-income populations. Table 10-4 presents the median household income, per capita income, and proportion of individuals living below the poverty threshold for the Project area based on the most recent American Community Survey 5-year estimate from the U.S. Census Bureau. Any poverty rate which is at least double the statewide poverty rate is considered meaningfully greater for the purposes of this environmental justice analysis.

Table 10-3.
Race and Ethnicity of Laborers and Helpers, 2006-2010 Estimate

Geographic Area	Total Laborers and Helpers	Race (Not Hispanic or Latino)							All Race, Hispanic [a]	Total Minority [b]
		White	Black or African-American	American Indian	Asian	Native Hawaiian/ Pacific Islander	Some Other Race	Two or More Races		
Fresno County	46,120	4,085	580	130	1,160	0	295	160	39,710	42,035
	100.0%	8.9%	1.3%	0.3%	2.5%	0.0%	0.6%	0.4%	86.1%	91.2%
Madera County	10,145	1,045	100	10	40	0	10	34	8,905	9,099
	100.0%	10.3%	1.0%	0.1%	0.4%	0.0%	0.1%	0.3%	86.1%	88.0%
Two-county Region	56,265	5,130	680	140	1,200	0	305	194	48,615	51,134
	100.0%	9.1%	1.2%	0.2%	2.1%	0.0%	0.5%	0.3%	86.4%	90.9%
California	870,025	167,320	29,900	3,085	34,505	3,205	4,765	6,985	620,260	702,705
	100.0%	19.2%	3.4%	0.4%	4.0%	0.4%	0.5%	0.8%	71.3%	80.8%

Source: U.S. Census Bureau 2012 (EEO Tabulation 2006-2010)

Notes:

[a] The term "Hispanic" is an ethnic category and can apply to members of any race, including respondents who self-identified as "white."

[b] "Total minority" is the aggregation of all non-white racial groups with the addition of all Hispanics, regardless of race.

Key:

% = percent

Table 10-4.
Income and Poverty, 2008-2012 Estimate

Geographic Area	Median Household Income	Per Capita Income	Population Below Poverty Threshold	
Fresno County	$45,741	$20,391	230,768	24.8%
CT 39	$34,135	$15,630	1,436	31.2%
CT 83.01	$34,607	$10,282	2,007	33.4%
Madera County	$47,937	$18,474	31,780	21.1%
CT 4	$33,750	$18,247	183	16.8%
Total CT's[1]	$34,164	$14,720	3,627	27.7%
Two-County Region[1]	$46,839	$19,433	262,548	24.3%
State of California	$61,400	$29,551	5,710,735	15.3%

Source: U.S. Census Bureau 2013, 2008-2012 American Community Survey 5-year estimates

Notes:

[1] Poverty rates calculated based on weighted population (relative to the percent population of each CT in the Total CT's and relative to the percent population of each county in the Two-County Region)

Key: % = percent

Overall, the two-county region contains a greater percentage of people living in poverty relative to the State (24.3 percent versus 15.3 percent, respectively); this does not exceed the threshold for this analysis. However, CT 39 and CT 83.01 in Fresno County have a meaningfully-greater proportion of people living below the poverty threshold at 31.2 percent and 33.4 percent, respectively. These data suggest that the Project area and vicinity is considered an environmental justice community of concern from the perspective of socioeconomic indicators.

Table 10-5 presents median annual wage information for farm-related occupations within the Project area based on recent data from the California Employment Development Department. As shown, the median wage for all farm-related occupations is $19,504 in Fresno County and $19,416 in Madera County. Both figures are less than the county-wide median wage for all industries ($41,852 and $43,956, respectively) and median wage earnings across the State ($52,630). All categories of agricultural workers earn less than the statewide average except for graders and sorters.[1] The information presented in Table 10-5 shows that median incomes in the farming industry are lower than the median income for all industries, with some less-skilled agricultural workers earning substantially less than regional averages.

[1] Comparable data for Agricultural Inspectors, Graders and Sorters, and Agricultural Workers, Other for Madera County were not available.

Table 10-5.
Agricultural Workers Median Annual Wages, 2012 (1st Quarter)

Geographic Area	Farming, Fishing, and Forestry Occupations-Overall	First-Line Supervisors	Agricultural Inspectors	Graders and Sorters	Equipment Operators	Farmworker (Crop, Nursery, Greenhouse)	Farmworker (Farm and Ranch Animals)	Agricultural Workers, Other	Median Wage, All Industries
Fresno County	$19,504	$31,512	$41,275	$19,847	$19,836	$18,821	$21,368	$38,584	$41,852
Madera County	$19,416	$30,158	$23,755	--	$22,064	$18,639	$20,249	--	$43,956
California	$20,944	$43,598	$47,283	$19,594	$24,150	$19,551	$25,672	$28,725	$52,630

Source: California EDD 2012
Key:
-- = data not available

10.1.2 Long-term Challenges for Agricultural Lands

Future water demand in the Central Valley is affected by a number of growth and land use factors, including population growth, planting decisions by farmers, and size and type of urban landscapes. Future population growth and development density will determine the extent of the urban landscape and encroachment into agricultural lands. The *California Water Plan* (Department of Water Resources 2013) has evaluated several growth and climate change scenarios and predicts an increase in urban water demand associated with increased population growth, a decrease in agricultural water demand due to a reduction in irrigated crop acreage (and due to an increase in water conservation measures for agriculture), and a decrease in agricultural supply reliability in the Central Valley. The Central Valley could experience increased fallowing of agricultural lands and an associated decrease in farm-related occupations, which could affect environmental justice communities. How these trends would apply specifically to Reach 2B is unknown.

10.2 Regulatory Setting

This section describes the Federal, State, regional, and local regulatory setting related to environmental justice.

10.2.1 Federal

Federal laws and regulations pertaining to environmental justice in the Project area are summarized briefly below.

Executive Order 12898

In 1994, President Clinton issued Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1994)*. EO 12898 requires each Federal agency to achieve environmental justice as part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects, including social or economic effects, of programs, policies, and activities on minority and low-income populations of the United States.

Council on Environmental Quality Guidance

The CEQ prepared *Environmental Justice Guidance under the National Environmental Policy Act* to assist Federal agencies in meeting their environmental justice commitments under the National Environmental Policy Act (NEPA). This guidance provides the following definition of the terms “minority” and “low income community” in the context of environmental justice analysis. Minority individuals are members of the following population groups: American Indian or Alaskan Native, Asian or Pacific Islanders, Black, and Hispanic. A low income community is one found to be below the poverty thresholds from the U.S. Census Bureau. CEQ has oversight for the Federal government’s compliance with EO 12898 and NEPA process, with the U.S. Environmental Protection Agency (EPA) serving as the lead agency responsible for implementation of the EO.

Environmental Compliance Memoranda No. ECM 95-3

The U.S. Department of the Interior, Office of Environmental Policy and Compliance (1995) confirms the requirement of EO 12898 for the U.S. Department of the Interior to consider impacts on minority and low-income populations and communities. A letter responding to an earlier request by the Secretary of the Interior states, "[H]enceforth, all environmental documents should specifically analyze and evaluate the impacts of any proposed projects, actions or decisions on minority and low-income populations and communities, as well as the equity of the distribution of the benefits and risks of those decisions."

10.2.2 State of California

State laws and regulations pertaining to environmental justice are discussed below.

Senate Bill 115

California was the first state to define environmental justice with Senate Bill (SB) 115. The bill defines environmental justice as "the fair treatment of people of all races, cultures and income with respect to development, adoption and implementation of environmental laws, regulations and policies." SB 115 added this language to California Government Code section 65040.12 and to Division 34 of the Public Resources Code relating to environmental quality. It also established the Governor's Office of Planning and Research as the coordinating agency for State programs and requested that the California Environmental Protection Agency (Cal/EPA) establish a model environmental justice policy for its boards, departments, and offices (California Resources Agency, undated).

California State Lands Commission Environmental Justice Policy

The California State Lands Commission (CSLC) pledges though its environmental justice policy to continue and enhance its processes, decisions, and programs with environmental justice as an essential consideration. It defines "environmental justice" in a manner consistent with the State as "the fair treatment of people of all races, cultures and income with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies." This definition is consistent with the Public Trust Doctrine principle that the management of trust lands is for the benefit of all of the people. The purpose of the environmental justice policy is to ensure that environmental justice is an essential consideration in the CSLC's processes, decisions and programs and that all people who live in California have a meaningful way to participate in these activities. Implementation of CSLC's environmental justice policy is similar to implementation of environmental justice under the NEPA process.

10.2.3 Regional and Local

There are no known regional or local plans or policies related to environmental justice.

10.3 Environmental Consequences and Mitigation Measures

10.3.1 Impact Assessment Methodology

This section describes the approach used to conduct the assessment of potential effects related to environmental justice. This assessment utilizes information on the demographic and social characteristics of the Project area to determine whether there are minority or low-income populations that could be disproportionately and adversely affected by the Project alternatives. The identification of minority and low-income populations in the Project area is based on a comparison of select social and demographic characteristics, including race, per capita income and poverty rates, of communities that would be affected by the Project (e.g., city of Mendota) with a reference population (the State). Minority or low-income populations in the Project area that are meaningfully greater in proportion than in the reference population are considered environmental justice populations of concern.

The minority and low-income populations prevalent in the Project area have been evaluated in the context of the potential for adverse socioeconomic and environmental effects of the Project to determine if they would be disproportionately affected. The evaluation of environmental justice effects on minority and low-income populations considers the magnitude and timing of economic and environmental impacts and the nexus between such impacts and the affected populations, including their extent of use of affected resources, such as resources that support subsistence living.

10.3.2 Disproportionately High and Adverse Criteria

Under NEPA, an analysis of environmental justice effects is required; however, there is no standard set of criteria for evaluating environmental justice impacts. Under the California Environmental Quality Act (CEQA), economic and social impacts are not considered significant effects on the environment; therefore, there is no guidance on assessing environmental justice effects in the State CEQA Guidelines Appendix G. For this analysis, the Project would result in an environmental justice impact if it would result in any of the following:

- An impact on the natural or physical environment that substantially and adversely affects a minority population, low-income population, or Indian tribe disproportionately relative to the general population. Such effects may include ecological, cultural, and human health impacts from environmental hazards.
- An economic or social impact on the human environment that substantially and adversely affects a minority population, low-income population, or Indian tribe disproportionately relative to the general population. Such effects may include reductions in income and employment opportunities.
- Physical impacts on resources, such as fish and wildlife, which are used for subsistence consumption.

If an impact remains significant after all mitigation is implemented, then the impact is included in the environmental justice analysis, and the equity of the impact across the Project area population is determined. In instances where the location of the impact could

be described, the demographic characteristics of the surrounding area were assessed to determine whether a minority or low-income population meaningfully greater than the proportion of minority and/or low-income residents in the general population was present. “Meaningfully greater” populations were interpreted to be either 50 percent of the total population of the geographic unit or simply “greater” than any other population group within the surrounding, larger geography (which provides for a more conservative analysis). Otherwise, the environmental justice analysis is evaluated at a broader, more regional scale. Potentially significant and unavoidable impacts and significant and unavoidable impacts are identified in other chapters of this Environmental Impact Statement/Report (EIS/R).

10.3.3 Impacts and Mitigation Measures

This section describes a project-level evaluation of potential impacts to environmental justice communities of concern in the Project area from impacts on the natural or physical environment (ecological, cultural, and human health impacts). The primary impacts of the Project alternatives that factor in the environmental justice analysis are associated with removing agricultural lands from production and Project construction and operations expenditures, which affect socioeconomic conditions throughout the regional economy. This section includes analyses of potential effects relative to No-Action conditions in accordance with NEPA. This methodology will serve to address the State policies explained in Section 10.2.2. The analysis is organized by Project alternative with specific impact topics numbered sequentially under each alternative. With respect to environmental justice, the relevant issues and concerns are:

1. Effects on Environmental Justice Communities of Concern from Removal of Land from Agricultural Production.
2. Effects on Environmental Justice Communities of Concern from Changes in Regional Activity Attributed to Agricultural Production.
3. Effects on Environmental Justice Communities of Concern from Changes in Regional Activity Attributed to Project Construction and Operations.
4. Effects on Environmental Justice Communities of Concern from Conversion of Designated Farmland to Nonagricultural Uses and Cancellation of Williamson Act Contracts.
5. Effects on Environmental Justice Communities of Concern due to Conflicts with Adopted Land Use Plans, Goals, Policies, and Ordinances
6. Effects on Environmental Justice Communities of Concern from Construction-Related Emissions of Criteria Air Pollutants and Precursors and Exposure of Sensitive Receptors to Substantial Concentrations of Toxic Air Contaminants.
7. Effects on Environmental Justice Communities of Concern from Physical Impacts on Resources Used for Subsistence Consumption (Fish and Wildlife).
8. Effects on Environmental Justice Communities of Concern from Inadequate or Reduced Emergency Access

There are other environmental justice-related issues covered in the Program Environmental Impact Statement/Report (PEIS/R) that are not covered here because they are not relevant to the Project area.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the San Joaquin River Restoration Program (SJRRP) would be implemented, including habitat restoration, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these activities would not achieve the Settlement goals. The analysis of environmental justice effects of the No-Action Alternative is based on a comparison to existing conditions.

Impact EJ-1 (No-Action Alternative): *Effects on Environmental Justice Communities of Concern from Removal of Land from Agricultural Production*. Under the No-Action Alternative, there would not be any land removed from agricultural production to accommodate the Project. Therefore, compared to existing conditions, a substantial decrease in the quantity of agricultural lands in the Project area would be unlikely, the No-Action Alternative would result in continued agricultural production, and local agricultural operations would continue to employ farm laborers and provide labor income to these workers, who are typically of Hispanic origin and generally part of the low-income population in the region. Disproportionately high and adverse effects on minority and low-income populations **would not occur** under the No-Action Alternative.

Impact EJ-2 (No-Action Alternative): *Effects on Environmental Justice Communities of Concern from Changes in Regional Activity Attributed to Agricultural Production*. As described in Impact EJ-1 (No-Action Alternative), there would likely be little to no land removed from agricultural production under the No-Action Alternative. Therefore, compared to existing conditions, there would be no change and local farms would continue to make expenditures in the local economy to support their operations, thereby generating economic benefits throughout Fresno and Madera counties, as measured by economic output, labor income, and jobs. Some of these regional benefits would accrue to minority and low-income populations residing in the two-county region. Disproportionately high and adverse effects on minority and low-income populations **would not occur** under the No-Action Alternative.

Impact EJ-3 (No-Action Alternative): *Effects on Environmental Justice Communities of Concern from Changes in Regional Activity Attributed to Project Construction and Operations*. Under the No-Action Alternative, the Project would not be implemented and there would not be any construction- and operations-related expenditures or employment supported by the Project that would generate economic benefits in the two-county region. There would be no change compared to existing conditions. Disproportionately high and adverse effects on minority and low-income populations **would not occur** under the No-Action Alternative.

Impact EJ-4 (No-Action Alternative): *Effects on Environmental Justice Communities of Concern from Conversion of Designated Farmland to Nonagricultural Uses and*

Cancellation of Williamson Act Contracts. Under the No-Action Alternative, the Project would not be implemented and there would not be any Project-related conversion of designated farmland to non-agricultural uses or cancellation of Williamson Act contracts that would affect agricultural workers which are disproportionately racial and/or ethnic minorities relative to State demographics. There would be no change compared to existing conditions as a result of Project-related activities. Therefore, disproportionately high and adverse effects on minority and low-income populations **would not occur** under the No-Action Alternative.

Impact EJ-5 (No-Action Alternative): ***Effects on Environmental Justice Communities of Concern due to Conflicts with Adopted Land Use Plans, Goals, Policies, and Ordinances.*** Under the No-Action Alternative, the Project would not be implemented and there would not be Project-related conflicts with adopted land use plans, goals, policies, and ordinances that would affect agricultural workers, which are disproportionately racial and/or ethnic minorities relative to State demographics. Therefore, disproportionately high and adverse effects on minority and low-income populations **would not occur** under the No-Action Alternative.

Impact EJ-6 (No-Action Alternative): ***Effects on Environmental Justice Communities of Concern from Construction-related Emissions of Criteria Air Pollutants and Precursors and Exposure of Sensitive Receptors to Substantial Concentrations of Toxic Air Contaminants.*** Under the No-Action Alternative, the existing regulatory framework would likely minimize adverse effects from emission of criteria air pollutants and precursors in localized areas. Local regulations that require dust abatement and criteria pollutant emissions reduction during construction are expected to reduce these impacts. However, there could be residual significant and unavoidable impacts from construction activities within the San Joaquin Valley Air Basin (SJVAB) that are unrelated to the Project, and regional effects could disproportionately affect low-income groups. If the SJVAB remains in nonattainment status for criteria air pollutants, then health impacts associated with poor air quality could affect low-income residents with less access to health care. Disproportionately high and adverse effects on minority and low-income populations **could occur**.

Impact EJ-7 (No-Action Alternative): ***Effects on Environmental Justice Communities of Concern from Physical Impacts on Resources Used for Subsistence Consumption (Fish and Wildlife).*** Under the No-Action Alternative, the Project would not be implemented and there would not be any Project-related physical changes on resources that would affect subsistence consumers which are disproportionately racial and/or ethnic minorities relative to State demographics. There would be no change compared to existing conditions as a result of Project-related activities. Therefore, disproportionately high and adverse effects on minority and low-income populations **would not occur** under the No-Action Alternative.

Impact EJ-8 (No-Action Alternative): ***Effects on Environmental Justice Communities of Concern from Reduced Inadequate or Emergency Access.*** Under the No-Action Alternative, the Project would not be implemented and there would not be changes in emergency access that would affect agricultural workers, which are disproportionately

racial and/or ethnic minorities relative to State demographics. Therefore, disproportionately high and adverse effects on minority and low-income populations **would not occur** under the No-Action Alternative.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

All of the Project alternatives, including Alternative A, would entail habitat restoration activities in conjunction with an expanded floodplain and widened levee alignment, as well as new Project facilities that promote fish passage through Reach 2B. The Project would result in adverse impacts on agricultural resources (refer to Chapter 16, "Land Use Planning and Agricultural Resources") and generate both socioeconomic impacts associated with losses in agricultural production and benefits attributed to construction and operations spending (refer to Chapter 21, "Socioeconomics and Economics").

Impact EJ-1 (Alternative A): ***Effects on Environmental Justice Communities of Concern from Removal of Land from Agricultural Production*****.** Compared to No-Action, Alternative A would permanently remove approximately 1,180 acres of agricultural land from production and 580 acres of cropland would likely be shifted to livestock grazing. Additional agricultural land would also be temporarily taken out of production affected during the multi-year construction period. Under Alternative A, termination of agricultural production on lands within the Project area would result in lower demand for farm labor. It is anticipated that 40 farm-level jobs and $1.8 million in annual labor income would be permanently lost when agricultural land is removed from production under Alternative A; temporary effects during construction are relatively minor. As described above, the agricultural labor force predominantly consists of workers of Hispanic origin with relatively low incomes. As a result, the adverse effects on local agricultural operations would be realized by an environmental justice community of concern in the Project area. Therefore, disproportionately high and adverse effects on minority and low-income populations **could occur** under Alternative A.

Impact EJ-2 (Alternative A): ***Effects on Environmental Justice Communities of Concern from Changes in Regional Activity Attributed to Agricultural Production*****.** Compared to No-Action, Alternative A would result in a decline in regional economic activity in the two-county region, namely losses in economic output (or production), labor income and jobs, in conjunction with decreased agricultural production in the Project area. Considering the inter-industry linkages between the agricultural sector and other sectors of the regional economy (i.e., "ripple" or multiplier effects), the total economic impacts in Fresno and Madera counties attributed to decreased agricultural production in the Project area include annual losses of 75 jobs and $3.1 million in labor income over the long term under Alternative A. While the direct economic impacts would primarily occur in the agricultural sector, as described in Impact EJ-1 (Alternative A), the regional economic impacts would be more widespread, affecting a range of industries, including agricultural-support and other businesses linked to agriculture. As such, the regional economic impacts would affect a cross-section of the local population, which has a relatively high proportion of minority and low-income residents. However, it is difficult to predict the extent to which these adverse effects would be realized by minority and/or low-income populations living in the region. As a result of impacts on regional

economic conditions, disproportionately high and adverse effects on minority and low-income populations in the region **could occur** under Alternative A.

Impact EJ-3 (Alternative A): ***Effects on Environmental Justice Communities of Concern from Changes in Regional Activity Attributed to Project Construction and Operations.*** Compared to No-Action, Alternative A would benefit the regional economy based on construction and operations expenditures that would generate increases in economic output, labor income and jobs based on inter-industry linkages among affected sectors in the economy. Within the two-county region, construction activity is expected to support a total of approximately 293 jobs and $19.7 million in labor income annually over the construction period under Alternative A. Over the long term, operations expenditures would support about $705,000 in labor income annually and 14 jobs in the region. The direct short-and long-term economic benefits would primarily occur in construction-related sectors, while the regional economic benefits would affect a wide range of industries. Accordingly, the increase in economic activity would benefit a cross-section of the local population, which is characterized by a relatively-high proportion of minority and low-income residents as described above. However, it is difficult to predict the extent to which these beneficial employment and income effects would be realized by minority and/or low-income populations living in the region. Disproportionately high and adverse effects on minority and low-income populations **would not occur** under Alternative A.

Impact EJ-4 (Alternative A): ***Effects on Environmental Justice Communities of Concern from Conversion of Designated Farmland to Nonagricultural Uses and Cancellation of Williamson Act Contracts.*** Proposed land use conversions associated with Alternative A would be inconsistent with local policies that call for the agricultural productivity of designated Farmland to be preserved and Williamson Act contracts to be maintained to the extent possible. The conversion of designated Farmland and cancellation of Williamson Act contracts could occur in the Project area. This significant and unavoidable impact is not expected to disproportionately affect specific geographic concentrations of low-income populations or minority groups because the effects would be distributed. However, the agricultural workers affected by reduced acreage of farmland are disproportionately racial and/or ethnic minorities relative to State demographics. The percentage of low-income agricultural workers who work in this area is also high. Therefore, disproportionately high and adverse effects on minority and low-income populations **could occur** under Alternative A.

Impact EJ-5 (Alternative A): ***Effects on Environmental Justice Communities of Concern due to Conflicts with Adopted Land Use Plans, Goals, Policies, and Ordinances.*** Proposed land use conversion in the Project area would conflict with adopted land use plans, goals, policies, and ordinances of affected jurisdictions. To recognize and minimize adverse effects on agricultural land use and zoning, Project proponents would notify Fresno and Madera County planning agencies of inconsistencies in designations and applicable polices for the affected areas. The population affected by land use conversion includes only one or two residences, which is too few for a disproportionately high and adverse effect. Therefore, disproportionately high and adverse effects on minority and low-income populations **would not occur**.

Impact EJ-6 (Alternative A): ***Effects on Environmental Justice Communities of Concern from Construction-related Emissions of Criteria Air Pollutants and Precursors and Exposure of Sensitive Receptors to Substantial Concentrations of Toxic Air Contaminants.*** The existing regulatory framework would minimize adverse effects from emission of criteria air pollutants and precursors near the Project area. However, there could be residual significant and unavoidable impacts from construction activities within the SJVAB, and regional and local effects could disproportionately affect low-income groups. If the SJVAB remains in nonattainment status for criteria air pollutants, then health impacts associated with poor air quality could regionally affect low-income residents with less access to health care. Project-related construction could affect local minority and low-income sensitive receptors. Disproportionately high and adverse effects on minority and low-income populations **could occur**.

Impact EJ-7 (Alternative A): ***Effects on Environmental Justice Communities of Concern from Physical Impacts on Resources Used for Subsistence Consumption (Fish and Wildlife).*** In Reach 2B, the primary resource for subsistence consumption is fishing in Mendota Pool and the river just downstream of Mendota Dam. Alternative A would not make physical changes to the portion of Mendota Pool that is publically accessible and typically used for fishing opportunities. Compared to the No-Action Alternative, the effects of Alternative A would be the same. Therefore, disproportionately high and adverse effects on minority and low-income populations **would not occur** under Alternative A.

Impact EJ-8 (Alternative A): ***Effects on Environmental Justice Communities of Concern from Inadequate or Reduced Emergency Access.*** Project alternatives would create temporary or permanent roadway discontinuities at Drive 10 ½ and/or the San Mateo Avenue crossing that could reduce emergency response times to private property north of the river. The potentially affected population includes residences and agricultural workers. Agricultural workers would be able to flee potential dangers such as brush fires and use alternative evacuation routes. Response times to residences north of the river near the crossings could be affected; however, the number of residences is too few for a disproportionately high and adverse effect. Therefore, disproportionately high and adverse effects on minority and low-income populations **would not occur**.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B proposes habitat restoration activities in conjunction with an expanded floodplain and widened levee alignment, as well as new Project facilities that promote fish passage through Reach 2B. The Project would result in adverse impacts on agricultural resources (refer to Chapter 16, "Land Use Planning and Agricultural Resources") and generate both socioeconomic impacts associated with losses in agricultural production and benefits attributed to construction and operations spending (refer to Chapter 21, "Socioeconomics and Economics").

Impact EJ-1 (Alternative B): ***Effects on Environmental Justice Communities of Concern from Removal of Land from Agricultural Production.*** Alternative B would generally have similar effects on environmental justice communities of concern as

described for Alternative A; refer to Impact EJ-1 (Alternative A) for more details. Compared to No-Action, Alternative B would permanently remove approximately 1,032 acres of agricultural land from production, and additional agricultural land would also be temporarily taken out of production affected during the multi-year construction period. In the context of environmental justice, it is anticipated that approximately 46 farm-level jobs and $2.1 million in annual labor income would be permanently lost under Alternative B, which would be realized predominantly by Hispanic workers characterized by low income levels. Therefore, disproportionately high and adverse effects on minority and low-income populations **could occur** under Alternative B.

Impact EJ-2 (Alternative B): ***Effects on Environmental Justice Communities of Concern from Changes in Regional Activity Attributed to Agricultural Production.*** Alternative B would have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-2 (Alternative A) for more details. Compared to No-Action, Alternative B would adversely affect the regional economy based on reductions in agricultural production in the Project area. Agricultural production losses under Alternative B would result in total losses of 93 jobs and $3.8 million annually over the long term throughout Fresno and Madera counties, which are characterized by relatively large numbers of minority and/or low-income populations; therefore, the regional economic impacts anticipated with the Project could adversely affect minority and/or low-income populations residing in the region. As a result, disproportionately high and adverse effects on minority and low-income populations **could occur** under Alternative B.

Impact EJ-3 (Alternative B): ***Effects on Environmental Justice Communities of Concern from Changes in Regional Activity Attributed to Project Construction and Operations.*** Alternative B would have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-3 (Alternative A) for more details. Compared to No-Action, Alternative B would generate regional economic benefits based on new spending on construction and operations activities associated with the Project. Within the two-county region, construction activity is expected to support a total of approximately 244 jobs and $16.1 million in labor income annually over the construction period. In addition, operations expenditures would support about $600,000 in labor income annually and 12 jobs over the long term. The regional economic benefits of Project construction and operations anticipated under Alternative B would benefit local residents in Fresno and Madera counties, which are characterized by relatively large numbers of minority and/or low-income populations. As a result, disproportionately high and adverse effects on minority and low-income populations **would not occur** under Alternative B.

Impact EJ-4 (Alternative B): ***Effects on Environmental Justice Communities of Concern from Conversion of Designated Farmland to Nonagricultural Uses and Cancellation of Williamson Act Contracts.*** This analysis and conclusion is the same as Impact EJ-4 (Alternative A). The conversion of designated Farmland and cancellation of Williamson Act contracts would occur in the Project area and agricultural workers affected by the reduced acreage of farmland are disproportionately racial and/or ethnic

minorities relative to State demographics. Disproportionately high and adverse effects on minority and low-income populations **could occur** under Alternative B.

Impact EJ-5 (Alternative B): *Effects on Environmental Justice Communities of Concern due to Conflicts with Adopted Land Use Plans, Goals, Policies, and Ordinances.* Alternative B would have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-5 (Alternative A) for more details. Disproportionately high and adverse effects on minority and low-income populations **would not occur**.

Impact EJ-6 (Alternative B): *Effects on Environmental Justice Communities of Concern from Construction-related Emissions of Criteria Air Pollutants and Precursors and Exposure of Sensitive Receptors to Substantial Concentrations of Toxic Air Contaminants.* This analysis and conclusion is the same as Impact EJ-4 (Alternative A). Regional and local effects could disproportionately affect minority and low-income populations. Disproportionately high and adverse effects on minority and low-income populations **could occur**.

Impact EJ-7 (Alternative B): *Effects on Environmental Justice Communities of Concern from Physical Impacts on Resources Used for Subsistence Consumption (Fish and Wildlife).* In Reach 2B, the primary resource for subsistence consumption is fishing in Mendota Pool and the river just downstream of Mendota Dam. Alternative B would not make physical changes to the portion of Mendota Pool that is publically accessible and typically used for fishing opportunities. Compared to the No-Action Alternative, the effects of Alternative B would be the same. Therefore, disproportionately high and adverse effects on minority and low-income populations **would not occur** under Alternative B.

Impact EJ-8 (Alternative B): *Effects on Environmental Justice Communities of Concern from Reduced Inadequate or Emergency Access.* Alternative B would have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-8 (Alternative A) for more details. Disproportionately high and adverse effects on minority and low-income populations **would not occur**.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C proposes habitat restoration activities in conjunction with an expanded floodplain and widened levee alignment, as well as new Project facilities that promote fish passage through Reach 2B. The Project would result in adverse impacts on agricultural resources (refer to Chapter 16, “Land Use Planning and Agricultural Resources”) and generate both socioeconomic impacts associated with losses in agricultural production and benefits attributed to construction and operations spending (refer to Chapter 21, “Socioeconomics and Economics”).

Impact EJ-1 (Alternative C): *Effects on Environmental Justice Communities of Concern from Removal of Land from Agricultural Production*. Alternative C would generally have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-1 (Alternative A) for more details.

Compared to No-Action, Alternative C would permanently remove approximately 1,520 acres of agricultural land from production, and additional agricultural land would also be temporarily taken out of production affected during the multi-year construction period. In the context of environmental justice, it is anticipated that approximately 37 farm-level jobs and $1.7 million in annual labor income would be permanently lost under Alternative C, which would be realized predominantly by Hispanic workers characterized by relatively low income levels. Therefore, disproportionately high and adverse effects on minority and low-income populations **could occur** under Alternative C.

Impact EJ-2 (Alternative C): ***Effects on Environmental Justice Communities of Concern from Changes in Regional Activity Attributed to Agricultural Production.*** Alternative C would have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-2 (Alternative A) for more details. Compared to No-Action, Alternative C would adversely affect the regional economy based on reductions in agricultural production in the Project area. Agricultural production losses under Alternative C would result in total losses of 67 jobs and $2.7 million annually over the long term throughout Fresno and Madera counties, which are characterized by relatively large numbers of minority and/or low-income populations; therefore, the regional economic impacts anticipated with the Project could adversely affect minority and/or low-income populations residing in the region. As a result, disproportionately high and adverse effects on minority and low-income populations **could occur** under Alternative C.

Impact EJ-3 (Alternative C): ***Effects on Environmental Justice Communities of Concern from Changes in Regional Activity Attributed to Project Construction and Operations.*** Alternative C would have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-3 (Alternative A) for more details. Compared to No-Action, Alternative C would generate regional economic benefits based on new spending on construction and operations activities associated with the Project. Within the two-county region, construction activity is expected to support a total of approximately 287 jobs and $18.1 million in labor income annually over the construction period. In addition, operations expenditures would support about $557,000 in labor income annually and 11 jobs over the long term. The regional economic benefits of Project construction and operations anticipated under Alternative C would benefit local residents in Fresno and Madera counties, which are characterized by relatively large numbers of minority and/or low-income populations. As a result, disproportionately high and adverse effects on minority and low-income populations **would not occur** under Alternative C.

Impact EJ-4 (Alternative C): ***Effects on Environmental Justice Communities of Concern from Conversion of Designated Farmland to Nonagricultural Uses and Cancellation of Williamson Act Contracts.*** This analysis and conclusion is the same as Impact EJ-4 (Alternative A). The conversion of designated Farmland and cancellation of Williamson Act contracts would occur in the Project area and agricultural workers affected by the reduced acreage of farmland are disproportionately racial and/or ethnic minorities relative to State demographics. Disproportionately high and adverse effects on minority and low-income populations **could occur** under Alternative C.

Impact EJ-5 (Alternative C): ***Effects on Environmental Justice Communities of Concern due to Conflicts with Adopted Land Use Plans, Goals, Policies, and Ordinances.*** Alternative C would have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-5 (Alternative A) for more details. Disproportionately high and adverse effects on minority and low-income populations **would not occur**.

Impact EJ-6 (Alternative C): ***Effects on Environmental Justice Communities of Concern from Construction-related Emissions of Criteria Air Pollutants and Precursors and Exposure of Sensitive Receptors to Substantial Concentrations of Toxic Air Contaminants.*** This analysis and conclusion is the same as Impact EJ-4 (Alternative A). Regional and local effects could disproportionately affect minority and low-income populations. Disproportionately high and adverse effects on minority and low-income populations **could occur**.

Impact EJ-7 (Alternative C): ***Effects on Environmental Justice Communities of Concern from Physical Impacts on Resources Used for Subsistence Consumption (Fish and Wildlife).*** In Reach 2B, the primary resource for subsistence consumption is fishing in Mendota Pool and the river just downstream of Mendota Dam. Alternative C would change the extent of Mendota Pool, limiting it to Fresno Slough with the Fresno Slough Dam. The area at Mendota Dam would typically have run of the river conditions and fishing regulations used to protect endangered salmon would be enforced in the area. However, subsistence fishing could still continue in Mendota Pool and Fresno Slough, which would remain accessible at nearby Mendota Pool Park. Compared to the No-Action Alternative, the effects of Alternative C would be less than substantial. Therefore, disproportionately high and adverse effects on minority and low-income populations **would not occur** under Alternative C.

Impact EJ-8 (Alternative C): ***Effects on Environmental Justice Communities of Concern from Reduced Inadequate or Emergency Access.*** Alternative C would have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-8 (Alternative A) for more details. Disproportionately high and adverse effects on minority and low-income populations **would not occur**.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D proposes habitat restoration activities in conjunction with an expanded floodplain and widened levee alignment, as well as new Project facilities that promote fish passage through Reach 2B. The Project would result in adverse impacts on agricultural resources (refer to Chapter 16, "Land Use Planning and Agricultural Resources") and generate both socioeconomic impacts associated with losses in agricultural production and benefits attributed to construction and operations spending (refer to Chapter 21, "Socioeconomics and Economics").

Impact EJ-1 (Alternative D): ***Effects on Environmental Justice Communities of Concern from Removal of Land from Agricultural Production***. Alternative D would generally have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-1 (Alternative A) for more details.

Compared to No-Action, Alternative D would permanently remove approximately 1,290 acres of agricultural land from production and 960 acres of cropland would be shifted to livestock grazing. Additional agricultural land would also be temporarily taken out of production affected during the multi-year construction period. In the context of environmental justice, it is anticipated that approximately 56 farm-level jobs and $2.6 million in annual labor income would be permanently lost under Alternative D, which would be realized predominantly by Hispanic workers characterized by relatively low income levels. Therefore, disproportionately high and adverse effects on minority and low-income populations **could occur** under Alternative D.

Impact EJ-2 (Alternative D): ***Effects on Environmental Justice Communities of Concern from Changes in Regional Activity Attributed to Agricultural Production.*** Alternative D would have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-2 (Alternative A) for more details. Compared to No-Action, Alternative D would adversely affect the regional economy based on reductions in agricultural production in the Project area. Agricultural production losses under Alternative D would result in total losses of 103 jobs and $4.3 million annually over the long term throughout Fresno and Madera counties, which are characterized by relatively large numbers of minority and/or low-income populations; therefore, the regional economic impacts anticipated with the Project could adversely affect minority and/or low-income populations residing in the region. As a result, disproportionately high and adverse effects on minority and low-income populations **could occur** under Alternative D.

Impact EJ-3 (Alternative D): ***Effects on Environmental Justice Communities of Concern from Changes in Regional Activity Attributed to Project Construction and Operations.*** Alternative D would have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-3 (Alternative A) for more details. Compared to No-Action, Alternative D would generate regional economic benefits based on new spending on construction and operations activities associated with the Project. Within the two-county region, construction activity is expected to support a total of approximately 258 jobs and $15.8 million in labor income annually over the construction period. In addition, operations expenditures would support about $564,000 in labor income annually and 11 jobs over the long term. The regional economic benefits of Project construction and operations anticipated under Alternative D would benefit local residents in Fresno and Madera counties, which are characterized by relatively large numbers of minority and/or low-income populations. As a result, disproportionately high and adverse effects on minority and low-income populations **would not occur** under Alternative D.

Impact EJ-4 (Alternative D): ***Effects on Environmental Justice Communities of Concern from Conversion of Designated Farmland to Nonagricultural Uses and Cancellation of Williamson Act Contracts.*** This analysis and conclusion is the same as Impact EJ-4 (Alternative A). The conversion of designated Farmland and cancellation of Williamson Act contracts would occur in the Project area and agricultural workers affected by the reduced acreage of farmland are disproportionately racial and/or ethnic

minorities relative to State demographics. Disproportionately high and adverse effects on minority and low-income populations **could occur** under Alternative D.

Impact EJ-5 (Alternative D): *Effects on Environmental Justice Communities of Concern due to Conflicts with Adopted Land Use Plans, Goals, Policies, and Ordinances.* Alternative D would have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-5 (Alternative A) for more details. Disproportionately high and adverse effects on minority and low-income populations **would not occur**.

Impact EJ-6 (Alternative D): *Effects on Environmental Justice Communities of Concern from Construction-related Emissions of Criteria Air Pollutants and Precursors and Exposure of Sensitive Receptors to Substantial Concentrations of Toxic Air Contaminants.* This analysis and conclusion is the same as Impact EJ-4 (Alternative A). Regional and local effects could disproportionately affect minority and low-income populations. Disproportionately high and adverse effects on minority and low-income populations **could occur**.

Impact EJ-7 (Alternative D): *Effects on Environmental Justice Communities of Concern from Physical Impacts on Resources Used for Subsistence Consumption (Fish and Wildlife).* In Reach 2B, the primary resource for subsistence consumption is fishing in Mendota Pool and the river just downstream of Mendota Dam. Alternative D would change the extent of Mendota Pool, limiting it to Fresno Slough with the Fresno Slough Dam. The area at Mendota Dam would typically have run of the river conditions and fishing regulations used to protect endangered salmon would be enforced in the area. However, subsistence fishing could still continue in Mendota Pool and Fresno Slough, which would remain accessible at nearby Mendota Pool Park. Compared to the No-Action Alternative, the effects of Alternative D would be less than substantial. Therefore, disproportionately high and adverse effects on minority and low-income populations **would not occur** under Alternative D.

Impact EJ-8 (Alternative D): *Effects on Environmental Justice Communities of Concern from Reduced Inadequate or Emergency Access.* Alternative D would have similar effects on environmental justice communities of concern as described for Alternative A; refer to Impact EJ-8 (Alternative A) for more details. Disproportionately high and adverse effects on minority and low-income populations **would not occur**.

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11.0 Geology and Soils

This chapter describes the environmental and regulatory settings for geology and soils, including mineral resources (sand, gravel, rock, gold, oil, and natural gas), erosion, sedimentation, and geomorphic processes. The chapter includes a discussion of existing geology and soils conditions and the potential impacts of the Project alternatives on geology and soils along the San Joaquin River from the Chowchilla Bifurcation Structure to approximately 2 miles below Mendota Dam. The Project area comprises the area that could be directly or indirectly affected by the Project. The Project area is located in Fresno and Madera counties, near the town of Mendota, California.

11.1 Environmental Setting

Because of the regional-scale nature of earth resources, the geology and soils characteristics addressed in this section are described in a regional context, referring to geologic and geomorphic provinces, physiographic regions, or other large-scale areas, as appropriate.

11.1.1 Geology

The various geologic processes active in California over millions of years have created many geologically and geomorphically different areas, called geomorphic provinces. The upper San Joaquin River lies in the Sierra Nevada Province and lower San Joaquin River and the Project area are in the Central Valley Province (California Geological Survey [CGS] 2002a).

The upper San Joaquin River is located in the central portion of the Sierra Nevada Province at its boundary with the eastern edge of the Central Valley Province. The Sierra Nevada Province encompasses the Sierra Nevada Mountains, and comprises primarily intrusive rocks, including granite and granodiorite,[1] with some metamorphic rocks that formed due to contact at depth with the intruding igneous rocks. Extrusive rocks also occur. Evidence of previous episodic volcanic activity within the San Joaquin River watershed includes discontinuous Pliocene to Pleistocene deposits observed within the middle fork of San Joaquin River, the Miocene deposits within the vicinity of Millerton Lake, and the Pleistocene Friant Pumice found downstream of Friant Dam (Wakabayashi and Sawyer 2001, Huber 1981, McBain & Trush 2002).

The Sierra Nevada Province is a tilted fault block nearly 400 miles long, with a high, steep multiple-scarp east face and a gently sloping west face that dips beneath the Central Valley Province (CGS 2002a). The central Sierra Nevada has a complex history of uplift and erosion. The greatest uplift tilted the entire Sierra Nevada block to the west. The high

[1] Granodiorite is an igneous rock similar to granite, but contains more plagioclase (calcium and sodium) feldspar than potassium feldspar and has more dark minerals.

elevation of the Sierra Nevada Mountains leads to the accumulation of snow, including the Pleistocene glaciation responsible for shaping much of the range. Snowmelt in the Sierra Nevada feeds the San Joaquin River and its major tributaries, including those upstream from Friant Dam as well as the Merced, Tuolumne, Stanislaus, and Mokelumne rivers and other tributaries downstream from the Merced River confluence. These large rivers and their smaller tributaries cut through the granitic rocks present in the upper San Joaquin River watershed, and through intrusive and extrusive rock formations and sedimentary and metamorphosed rocks farther to the west. The metamorphic bedrock in these watersheds contains gold-bearing veins in the northwest-trending Mother Lode that are not present in the more southerly watershed of the upper San Joaquin River (CGS 2002b).

The Central Valley Province encompasses the Central Valley, an alluvial plain about 50 miles wide and 400 miles long in the central part of California, stretching from just south of Bakersfield northward to Redding. The San Joaquin Valley makes up approximately the southern half of the Central Valley Province and is drained by the San Joaquin River. The Sacramento Valley makes up the northern half of the Central Valley Province and is drained by the Sacramento River. The San Joaquin River and its tributaries flow out of the Sierra Nevada Province into the Central Valley, depositing sediments on alluvial fans, in riverbeds, on floodplains, and on wetlands of the Central Valley Province. The Central Valley Province is characterized by alluvial deposits and continental and marine sediments deposited almost continually since the Jurassic Period (CGS 2002b). Quaternary age[2] alluvium is identified and mapped at the ground surface throughout the entire Project area and vicinity (Figure 11-1).

Alternating marine and continental deposits of Tertiary age underlie much of the Central Valley Province, including the San Joaquin Valley (Page 1986). The more recent Quaternary Period was characterized by continental sedimentary deposition. Tertiary and Quaternary continental formations in the San Joaquin Valley are composed of alluvial deposits of gravel, sand, silt, and clay and contain lenses of clay and silt comprising lacustrine, marsh, and floodplain deposits. These Tertiary and Quaternary deposits are of varying thickness, in some instances, thousands of feet thick (Page 1986). Continental formations (i.e., Mehrten, Kern River, Laguna, San Joaquin, Tulare, Tehama, Turlock, Riverbank, and Modesto Formations) make up the major aquifer(s) of the San Joaquin Valley (Ferriz 2001, Page 1986).

[2] The Quaternary Period, our current period in the geologic time scale, is divided into two epochs: the Pleistocene (2.588 million years ago to 11.7 thousand years ago) and the Holocene (11.7 thousand years ago to today).

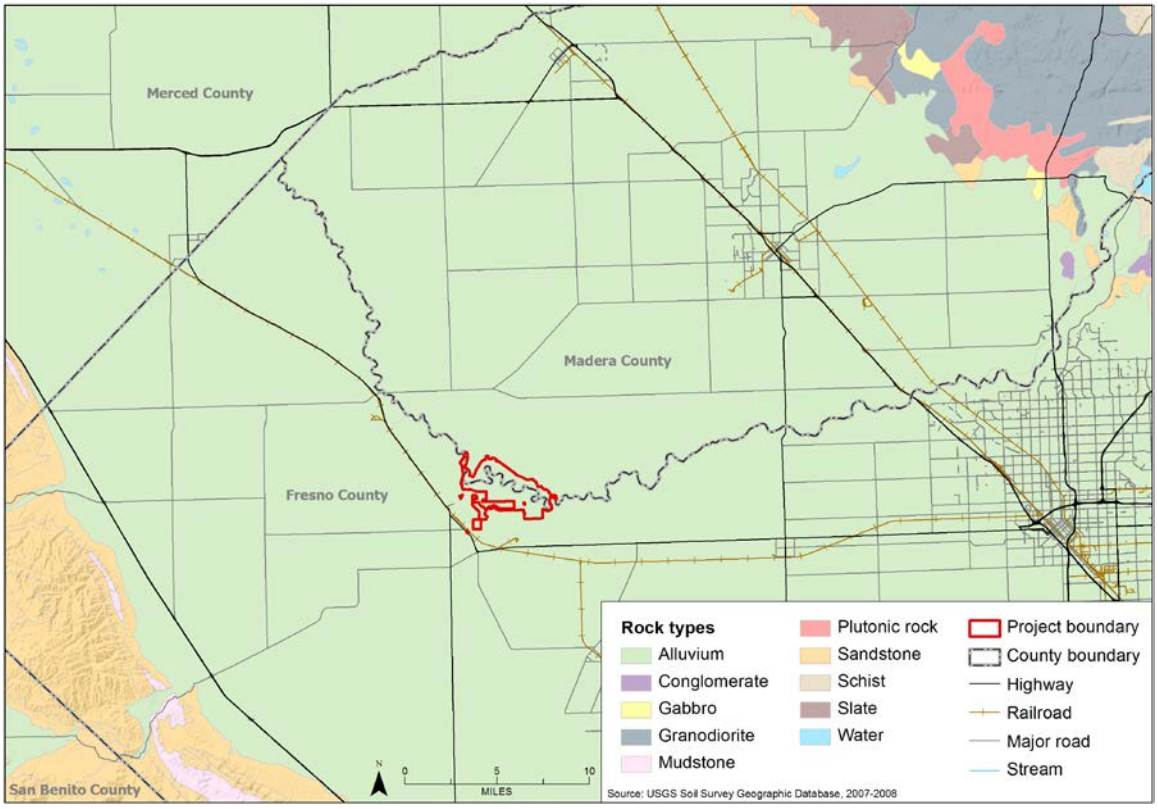


Figure 11-1.
Regional Geology

The San Joaquin Valley is a structural trough into which sediments have been deposited as much as 6 miles deep. Some of these sediments eroded from the Sierra Nevada and were transported and deposited in the Central Valley. Tectonic activity during the Tertiary Period strongly influenced the evolution of the Central Valley, alternately trapping water in the San Joaquin Valley or entire Central Valley to form inland seas that deposited marine sediments, and opening to allow drainage to the ocean, as under current conditions.

Surficial geology along Reach 2B is dominated by Holocene age alluvial deposits. These geologically young deposits cover the entire central San Joaquin Valley area. No bedrock is present on the ground surface. Sedimentary rock is exposed to the west in the Coast Ranges and igneous and metamorphic rocks are present in the Sierra Nevada to the east.

11.1.2 Soils

Soil development depends on parent material, climate, associated plants, topography, and age. Because these factors are similar within physiographic regions, soils within a physiographic region are often similar.

Soil Type

Soils in the Project area are described as valley basin soils on the regional soil map (University of California Division of Agricultural Sciences 1980) (Figure 11-2). Valley Basin soils consist of organic soils, imperfectly drained soils, and saline and alkali soils in the valley trough and on the basin rims.

The Valley Basin imperfectly drained soils generally contain dark clays, have a high water table, and are subject to overflow. These soils are found in the trough of the San Joaquin Valley, and consist in part of several thick lake bed deposits.

The Valley Basin saline/alkali soils are characterized by excess salts (saline), excess sodium (sodic), or both (saline-sodic). In many of the older soil surveys, salinity and sodicity were jointly referred to as alkaline. A distinction was sometimes made because the saline soil many times formed a white crust on the surface and was called "white alkali," and the soils with excess sodium appeared to be "black," thus, black alkali. Both are fairly common throughout the San Joaquin Valley. In uncultivated areas, saline soils are used for saltgrass pasture and native range. Some of these soils support seasonal salt marshes. In areas of intermediate to low rainfall, these soils are saline-sodic. Many of these soils are irrigated with moderately saline Delta surface water, imported via the Delta-Mendota Canal (DMC), or with slightly saline groundwater. In addition, salts are added through application of fertilizers or other additives needed for cropping.

The accumulation of salts in the soils of the San Joaquin Valley is due to a combination of the regional geology, high water table, intensive irrigation practices, and the importation of water from the Delta that is moderate in salinity and application to lands in the region. The Corcoran Clay and other clay layers contribute to a naturally high water table in the valley, concentrating salts in the root zone by evaporation through the soil. Farmers actively leach these salts from the soil into drainage water with irrigation and subsurface drainage practices. Drainage water with high concentrations of salts may be reused for irrigation (with or without treatment), accumulate in groundwater, or be discharged to evaporation ponds or tributaries to the San Joaquin River. Salinization caused by concentrations of naturally-occurring soil salts is exacerbated by the use of more saline Delta water, imported via the DMC and California Aqueduct, as a major source of irrigation water.

Additionally, naturally occurring trace elements in soils may be mobilized and concentrated along with salts. Soils throughout the San Joaquin Valley typically contain some selenium, and soils on the west side of the valley are particularly selenium-rich. These soils have developed on alluvial deposits comprising eroded material from the Coast Range, where selenium is found in marine deposits. Selenium can pose a hazard to fish and wildlife when it becomes highly concentrated in surface waters.

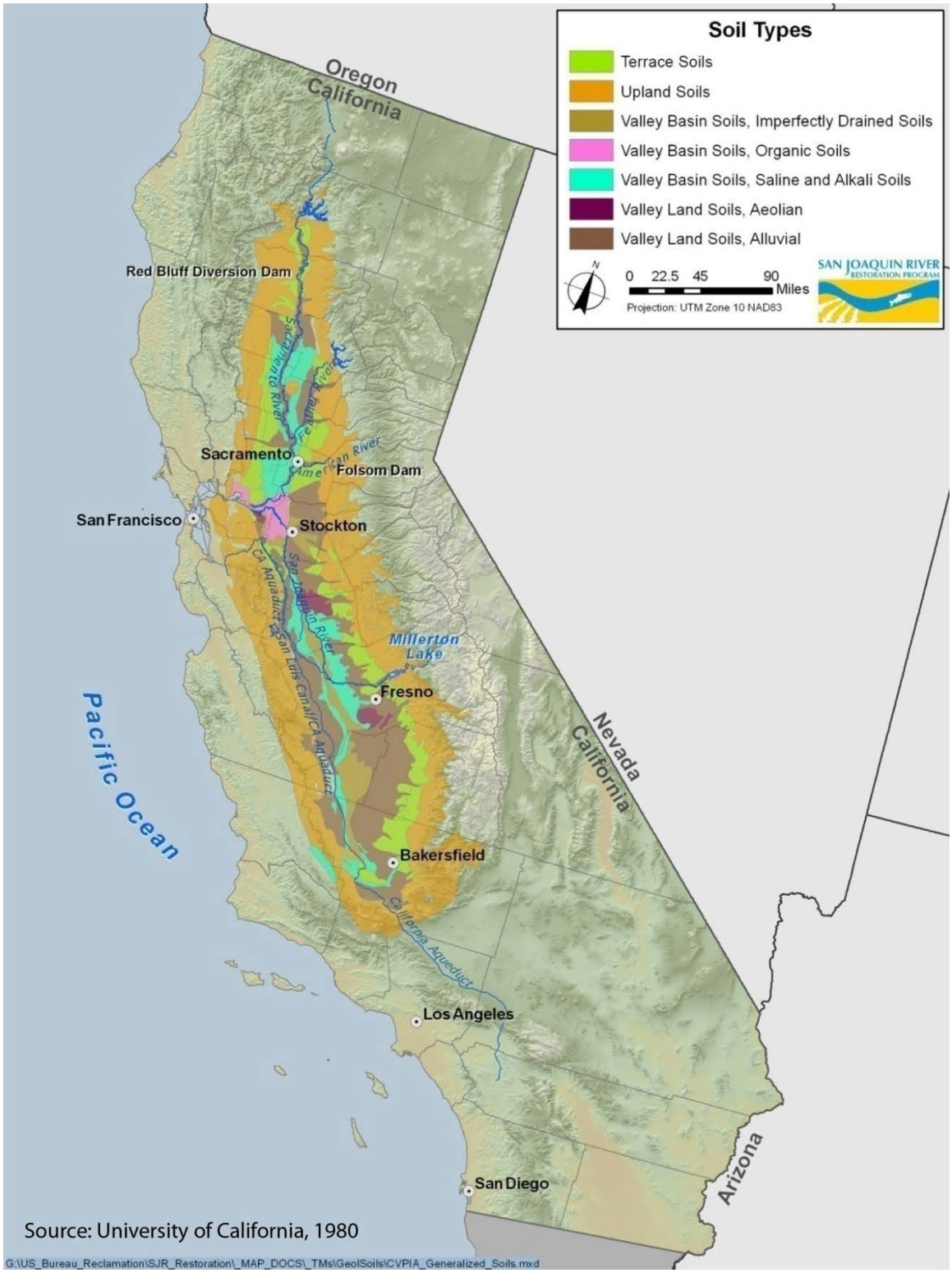


Figure 11-2.
Physiographic Soil Types in the Central Valley and Delta

A soil map of the Project footprint is shown on Figure 11-3 and the acreage of each soil type is presented in Table 11-1. The main soil types mapped in the area are Grangeville fine sandy loam, Chino fine sandy loam, and Chino loam (National Resources Conservation Service [NRCS] 2008). All of these soils are mixtures of sand, silt, and clay derived primarily from the weathering of granitic bedrock; the soils are differentiated based upon several soil properties such as amount of calcium carbonate or salt or organic matter content, for example. The primary use of soils within the Project area is for farming.

Table 11-1.
General Soils Data in the Project Footprint

Soil Type	Acreage
Cajon loamy sand	0.5
Calflax clay loam	3.0
Chino fine sandy loam	325
Chino loam	1,812
Chino sandy loam	105
Columbia fine sandy loam	7.4
Columbia loamy sand	98
Columbia soils	19
Dello sandy loam	64
Elnido sandy loam	51
Foster loams	1.8
Grangeville fine sandy loam	1,651
Grangeville sandy loam	158
Merced clay	8.2
Palazzo sandy loam	31
Posochanet clay loam	2.5
Riverwash	68
Tachi clay	358
Tranquillity clay	81
Traver fine sandy loam	7.5
Traver loam	60
Traver sandy loam	14
Tujunga loamy sand	391
Visalia fine sandy loam	16
Visalia sandy loam	21
Water	442
Wunjey very fine sandy loam	97
Total Acreage	5,894

Source: NRCS 2008

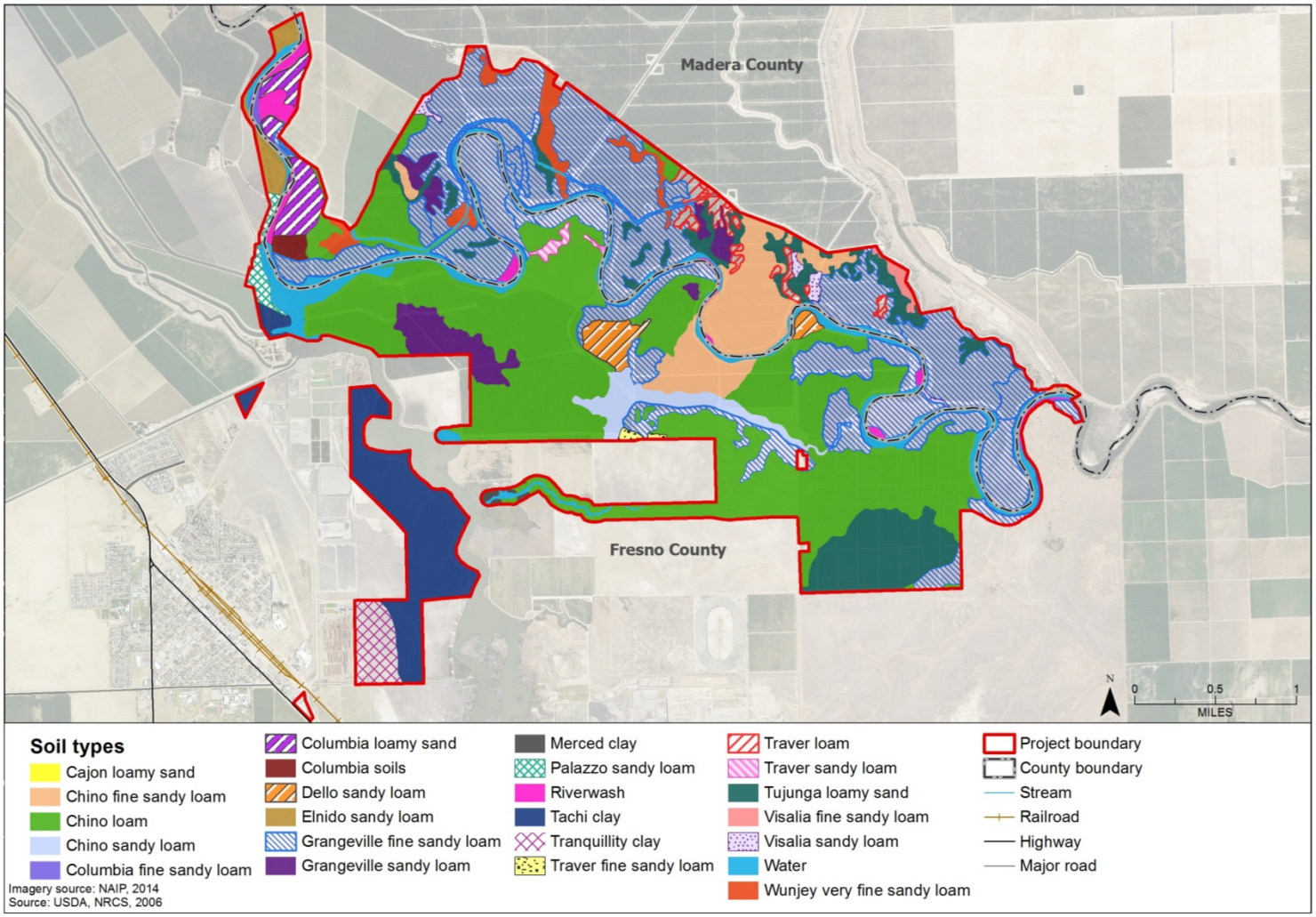


Figure 11-3.
General Soils Type in the Project Footprint

Generalized Soil Texture

Soils and sediments in the Project area and vicinity are composed of a heterogeneous mix of recent river channel deposits, recent floodplain deposits, and older deposits. The texture of these sediments ranges from coarse-grained gravels to fine-grained clays, and the distribution of these textures can have a strong influence on the hydrogeology of the underlying aquifer system. Table 11-2 contains the calculated areas in acres for each generalized soil texture in the Project area. Soils are predominantly classified as sandy loam and loam.

Table 11-2.
Acreages of Soil Textures in Project Footprint

Soil Texture	Acreage
Clay/Clay Loam	453
Loam	1,875
Sand	489
Sandy Loam	2,547
Variable[1]	530
Total Acreage	5,894

Source: NRCS 2008

Note:

[1] The category "variable" includes soils of undifferentiated texture and areas that were not mapped by the National Resources Conservation Service (i.e., areas covered by water during the mapping period).

Levee seepage has been a concern in the Project area and vicinity. Under-seepage, water that seeps laterally by travelling under a dam or levee section, can occur when structures are underlain by permeable native soils. Movement of water through or underneath levees, commonly appearing as boils or piping (seeps), may saturate the levee or transport foundation materials and compromise the short- or long-term integrity of the levee. Levee seepage can also raise groundwater surface elevations in adjacent areas, thereby increasing soil saturation and potentially reducing crop yields and/or increasing crop mortality.

11.1.3 Erosion and Sedimentation

The sediment load of the San Joaquin River and its tributaries originates from the erosion of soil and rock in the watershed. The sediment load of the San Joaquin River, like most rivers, generally becomes finer grained with distance downstream.

Soil Erosion Potential

Soil erosion is a natural physical process of wearing away and transport of soil materials by wind, water, ice, and gravity. Erosion can remove soils, undermining structures like bridges, and can lead to unstable steep slopes. Erosion is followed by deposition of the eroded materials, typically in low-lying areas, causing sedimentation of streams and reservoirs. Erosion also can result in landslides that may damage roads, buildings, and other infrastructure. Soil characteristics that affect the erosion rate are soil surface texture and structure, particle size, permeability, infiltration rate, and the presence of organic or other cementing materials. Other key factors determining erosion potential are the extent

of vegetation, type of cover (vegetative or otherwise), human or other disturbance, topography, and rainfall.

Human activities can also effectively accelerate natural erosion processes. Localized sedimentation problems can occur with construction and development or agricultural activities, which usually involve vegetation removal, compaction of porous soils, and concentrated drainage from large areas. Improper agricultural management practices can accelerate erosion. Overgrazing and land clearing, particularly on steep slopes, but also on flat areas, make surfaces vulnerable to topsoil loss. Elevation measurements made from 1922 to 1981 indicate that even typical agricultural practices, regardless of crop type, may cause up to 1 to 3 inches of soil loss per year (Rojstaczer et al. 1991).

Infrastructure Effects on Sediment Transport

A significant effect of dams and water storage reservoirs on a watershed is on sediment supply because they serve as impediments to downstream sediment transport. Because of the slowing of stream flow velocity in the reservoir, sediment settles out of the water column and onto the reservoir bottom. Although the water and some of its fine sediment may be released on the downstream side of the dam, the majority of the sediment load, particularly the coarser materials (gravel, sand, and some silt), remains on the upstream side. Friant Dam stops most of the sediment from the upper San Joaquin River watershed from moving downstream. Reservoirs also create a transport-limited system downstream of the dam by reducing the frequency and/or intensity of natural high-flow regimes that were prevalent prior to dam construction. This limits gravel mobility and promotes bed coarsening/bed armoring.

Under unaltered conditions, fluvial processes, including sediment transport, are naturally adjusted along the length of a river to match the channel gradient, stream discharge, and sediment load. Flow energy in the river channel is dissipated gradually. Bridges and culverts constrict the natural channel and disrupt these processes. This may occur at high and/or low flows, depending on the size of the structure.

Effects of channel constrictions caused by bridge and culvert crossings include the following:

- Sediment deposition upstream from the constriction (backwater effects).
- Scour at the constriction due to an elevated water surface and increased water velocity.
- Sediment deposition downstream from the constriction due to flow expansion, leading to the formation of splay bars.
- Reduced flood conveyance capacity due to filling in of floodplain space when building bridge and culvert abutments.
- Catastrophic erosion of bridge or culvert crossing (and possibly surrounding areas) during large storm events due to channel blockage at constriction by debris such as trees, bushes, or other natural or man-made materials.

The function and operation of the water supply and flood control infrastructure present in the Project area and vicinity also affect fluvial processes of the San Joaquin River. Such infrastructure includes diversion structures, bypasses and bypass diversions, other hydraulic control structures, off-stream flood control dams, levees, and canals. These structures divert base flows and/or flood flows and constrict flood flows and thereby significantly alter fluvial processes. The processes most affected are sediment transport, local incision and deposition, and channel migration (Table 11-3).

Table 11-3.
Generalized Effects on Geomorphic Processes of Major Flood Control and Water Supply Infrastructure

Infrastructure	Effects
Diversion structures	Backwater effects cause disruption of local incision and deposition patterns; riprap protection prevents channel migration and avulsion; reroute sediment load
Bypasses	Reroute sediment load within the Project area
Bypass diversion structures	Backwater effects cause disruption of local incision and deposition patterns; reroute sediment load within the Project area
Other hydraulic control structures	Backwater effects cause disruption of local incision and deposition patterns; reroute sediment load within the Project area
Offstream flood control dams	Reroute sediment load within the Project area and vicinity
Levees	Dissect the historic floodplain, stop channel migration and avulsion, increase river velocity and, thus, also increase incision, bed armoring, and channel simplification
Canals	Embankments dissect the historic floodplain, stop channel migration and avulsion, increase river velocity and, thus, also increase incision, bed armoring, and channel simplification; reroute sediment load

Sediment load is carried by stream flow, and infrastructure that reroutes these flows alters sediment transport. Levees and canal embankments, especially those that are constructed within the floodplain and not sufficiently set back from the channel, dissect the historic floodplain preventing channel migration and avulsion.[3] This prevents oxbow formation and also increases river velocity, which encourages channel incision, bed armoring, and channel simplification.

Specific flood control and water supply infrastructure in the Project area and its effects on sediment transport are discussed below.

Local Erosion and Sedimentation

With the combination of agricultural development, reduction of the high-flow regime under controlled releases from Friant Dam, construction of levees, and incorporation of flood control structures with bypass channels, such as the Chowchilla Bypass, the river channel became simplified. High-flow scour channels were eliminated, the main channel footprint was reduced, and side channels were cut off from the main river. Prior to

[3] Avulsion is the rapid abandonment of a river channel and the formation of a new river channel.

implementation of Interim Flows, most sediment was routed through the Chowchilla Bypass and very little sediment moved through Reach 2B. Instead, most sediment was routed with flows into the bypass, or accumulated in sand traps immediately upstream of the bypass.

Historically, when flows through Reach 2 were more consistent, sediment supply and transport capacity decreased gradually from Reach 1B through Reach 2 as sediment was deposited on the floodplain and multiple side channels evolved across the floodplain. This is demonstrated by the presence of remnant channel deposits and relic floodplain features.[4] As water infrastructure was built in Reach 2B, sediment transport was affected. Small diversion structures, like Mendota Dam, affect sediment transport by modifying the delivery of sediment downstream. The culvert at the San Mateo Avenue crossing is a constriction in the stream channel during low stream flows, which can cause backwater, scour, and deposition. At higher discharge levels, the culvert becomes overwhelmed and the river flows over the crossing.

Lack of vegetation and the sandy substrate would cause the riverbed to be easily eroded when flows pass through the reach. Bed mobility can occur at most baseflows, and bed scour could occur throughout the reach at moderate to high flows. As a result of this erosion, channel avulsion and migration could occur between the levees if the levees were not constraining the channel. The river banks are another area where soil erosion is occurring in the Project footprint and are likely areas where soil erosion would occur in the future. U.S. Geological Survey (USGS) data (USGS 2007 and 2008) indicate that soils, primarily on the left bank, may be highly erodible (Figure 11-4).

11.1.4 Geomorphology

The San Joaquin Valley floor is divided into several geomorphic land types, including dissected uplands, alluvial fans and plains, river channels and floodplains, and overflow lands and lake bottoms. The alluvial plains cover most of the valley floor and make up some of the intensely developed agricultural lands in the San Joaquin Valley. River floodplains and channels lie along the major rivers and to a lesser extent the smaller streams that drain into the valley from the Sierra Nevada. Some floodplains are well-defined where rivers incise their alluvial fans. These deposits tend to be coarse and sandy in the channels and finer and silty in the floodplains. Lake bottoms of overflow lands include historical beds of Tulare Lake, Buena Vista Lake, and Kern Lake as well as other less defined areas in the valley trough.

The Project footprint extends downstream from the Chowchilla Bifurcation Structure to about 2 miles below Mendota Dam. The lack of confining features and the reduced gradient in Reach 2B both cause the channel to change to sand-bedded, meandering morphology. Meanders become more sinuous in Reach 2B than upstream as the river runs up against the alluvial deposits of the Coast Range drainages. This is also the point of diversion for the Chowchilla Bifurcation Structure, which, prior to Interim Flows, diverted most of the flows that enter Reach 2B into the Chowchilla Bypass. Lone Willow

[4] Relic floodplain features, which have coarser sediment than the adjacent floodplain, may provide a lateral conduit for levee seepage.

Slough is a historical side channel that begins near the Chowchilla Bifurcation Structure and terminates in Reach 3. Today, this channel carries riparian diversions for irrigation, agricultural return flows, and runoff.

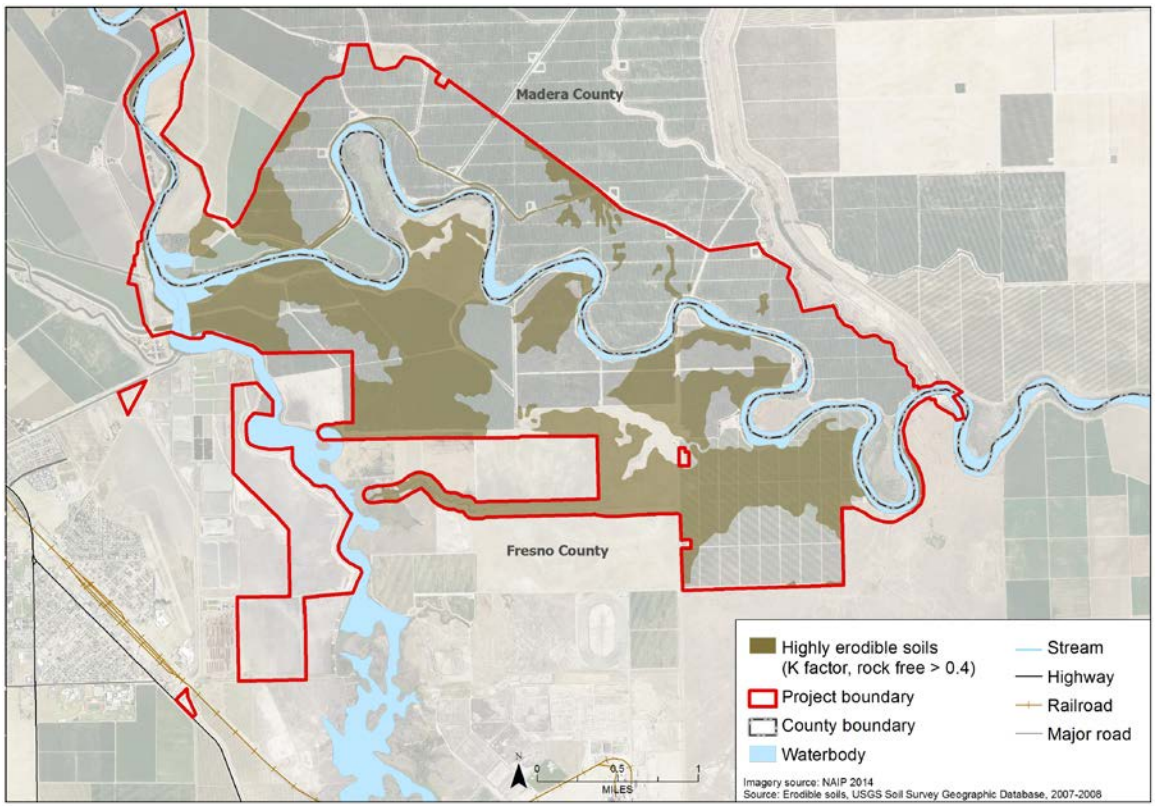


Figure 11-4.
Erodible Soils in the Project Footprint

The river slope in Reach 2B decreases to 0.00022 or about 1 foot per mile, which is almost a factor of 2 less than the slope in Reach 2A. The median bed material diameter is approximately 0.026 inches (Mussetter Engineering, Inc. 2002). Currently, water operations allow a maximum flow of approximately 810 cubic feet per second (cfs) in this reach with all excess flow diverted into the Chowchilla Bypass. The geomorphology of Reach 2B is discussed in depth in Chapter 14.0, "Hydrology – Surface Water Resources and Water Quality."

11.1.5 Soil Hazards

Reach 2 soils have natural selenium content. According to a soil survey from the mid-1980s, soils in the upper portion of the Project footprint contain 0.10 to 0.13 parts per million (ppm) of selenium in the top 12 inches of soil. The lower portion of the Project footprint contains 0.14 to 0.36 ppm selenium in the top 12 inches of soil (San Joaquin Valley Drainage Implementation Program [SJVDP] 1990). Data collected more recently from Mendota Pool found selenium concentrations in sediments up to 0.95 ppm, but aqueous concentrations in soil elutriate were less than 3 parts per billion (ppb) which is

below the aquatic life criteria of 5 ppb (San Joaquin River Restoration Program [SJRRP] 2012). The presence of selenium can affect surface water quality and is discussed in Chapter 14, "Hydrology – Surface Water Resources and Water Quality."

Soil corrosivity involves the measure of the potential of corrosion for steel and concrete caused by contact with some types of soil. Knowledge of potential soil corrosivity is often critical for the effective design of cathodic protection of buried steel and concrete elements. Factors including soil composition, soil chemistry, moisture content, and pH affect the response of steel and concrete to soil corrosion. Soils with high moisture content, high electrical conductivity, high acidity, or high dissolved salts content are most corrosive. In general, sandy soils have high resistivities and are the least corrosive. Clay soils, including those that contain interstitial salt water, can be highly corrosive.

Figure 11-5 indicates that the soils in the Project footprint generally have low corrosivity to buried concrete elements except in the Fresno Slough area were soils are moderately corrosive to concrete. Figure 11-6 shows that the soils generally have high corrosivity to buried steel.

Expansive soils are those that undergo a significant increase in volume during wetting, and shrink in volume as they decrease in water content, also known as shrink-swell soils. Expansive soils can cause significant damage to structures due to increases in uplift pressures. Soils are generally classified as having low, moderate, and high expansive potentials. Soils containing a high percentage of clay types particularly susceptible to expansion usually have high expansive potentials, and more granular sands and gravels generally have low expansive potential. Figure 11-7 shows that nearly all of the soils within the Project footprint have low shrink-swell potential. The southwest portion of the site west of Fresno Slough has very high shrink-swell potential.

11.1.6 Mineral Resources

In 2006, California ranked third in the nation in nonfuel mineral production. In that year, California yielded $4.6 billion in nonfuel minerals, totaling 7 percent of the Nation's entire production (Kohler 2006). Of these products, construction sand and gravel are the most widely mined resources in the vicinity of the San Joaquin River. Historically, gold was also extracted from the riverbed.

Sand, Gravel, and Other Rock Products

In 2006, California was the Nation's largest producer of construction sand and gravel ($1.5 billion) and Portland cement ($1.25 billion) (Kohler 2006). California also produced significant quantities of crushed stone ($481 million), industrial sand and gravel ($62.2 million), masonry cement ($87.8 million), and dimension stone ($11.2 million). Together, the market value of these products total $3.4 billion, almost 75 percent of the total value of State nonfuel mineral production. The San Joaquin River below Friant Dam is a significant source of sand and gravel in the State, and mining occurs at multiple locations on the floodplain and river terraces upstream of the Project area (Mussetter Engineering, Inc. 2002). One aggregate mine is present near the downstream limit of the Project footprint (Figure 11-8) (California Department of Conservation, Office of Mine Reclamation 2011).

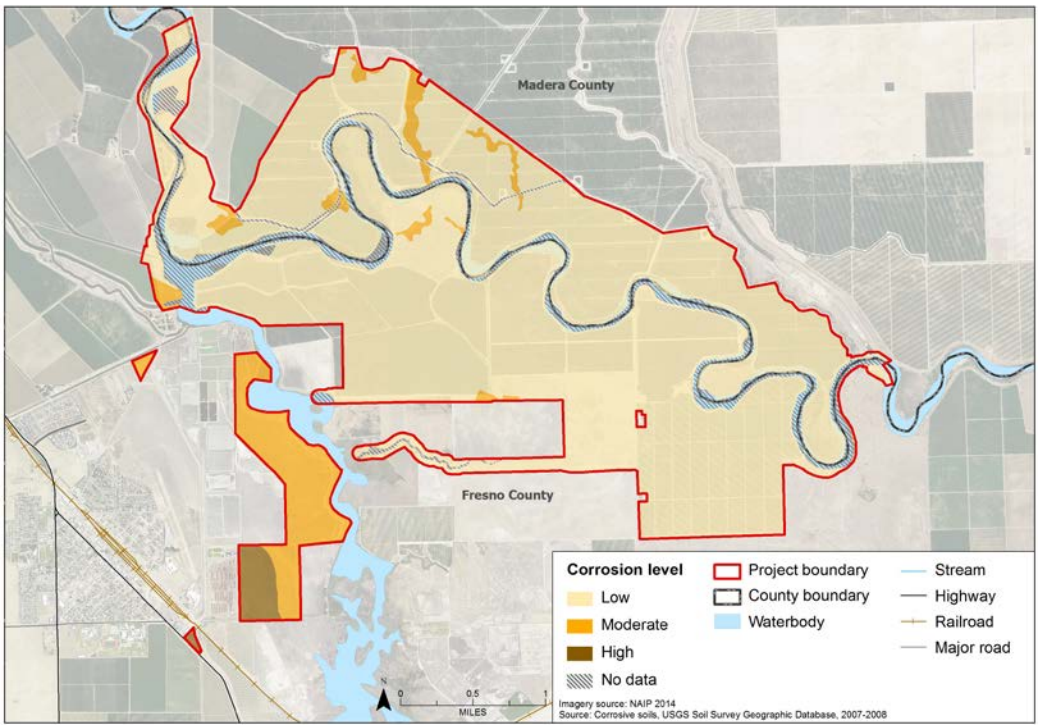


Figure 11-5.
Corrosion Level of Soils to Concrete in the Project Footprint

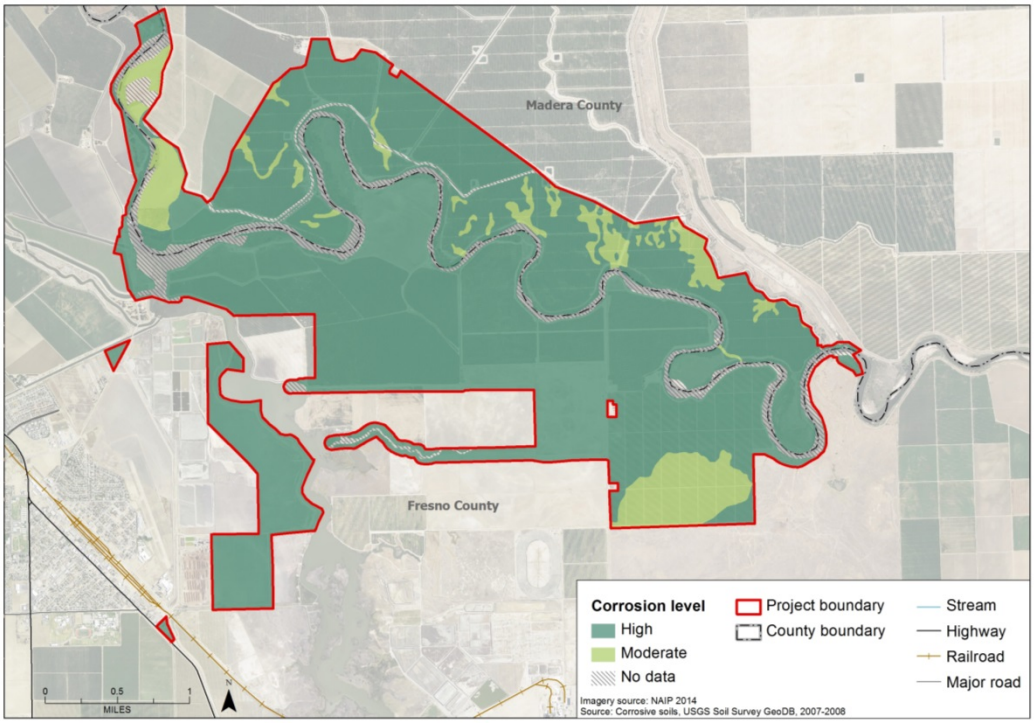


Figure 11-6.
Corrosion Level of Soils to Uncoated Steel in the Project Footprint

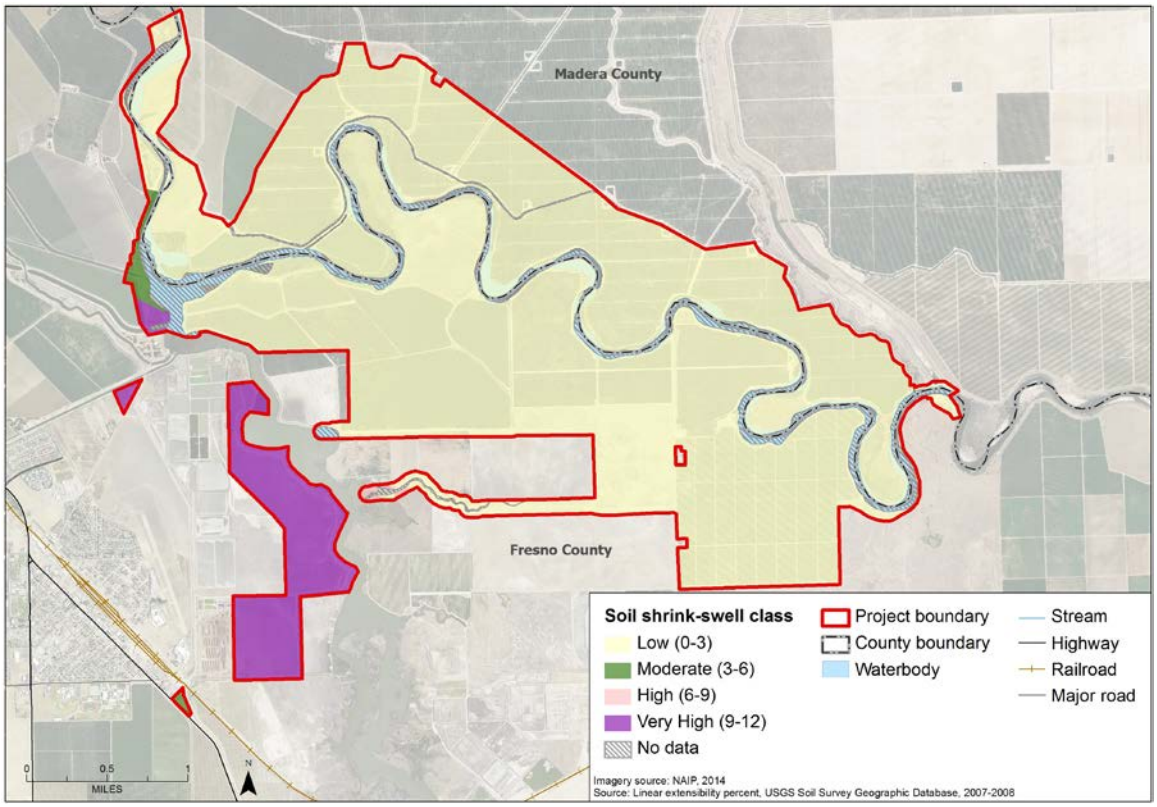


Figure 11-7.
Soil Shrink-Swell Classes in the Project Footprint

Gold

Gold has been mined from placer deposits in loosely consolidated alluvial sediments throughout the Sierra Nevada foothills. The San Joaquin River above Friant Dam was subject to some degree of placer mining from 1848 to 1880, followed by dredge mining from 1880 to the 1960s (Mussetter Engineering, Inc. 2002). These activities significantly reworked the riverine environments, redistributing sediments and altering channel forms. However, the San Joaquin River was less affected by dredge mining than the more northerly Sierra Nevada drainages, where gold was more plentiful (McBain and Trush 2002). Aside from recreational gold mining that has been observed to occur near the town of Friant, gold extraction does not currently occur on any part of the San Joaquin River.

Oil and Natural Gas

The San Joaquin Valley is one of the largest sources of oil in California, although most of the oil wells are south of the Project area. Figure 11-9 shows nearby oil fields. None are within the Project footprint.

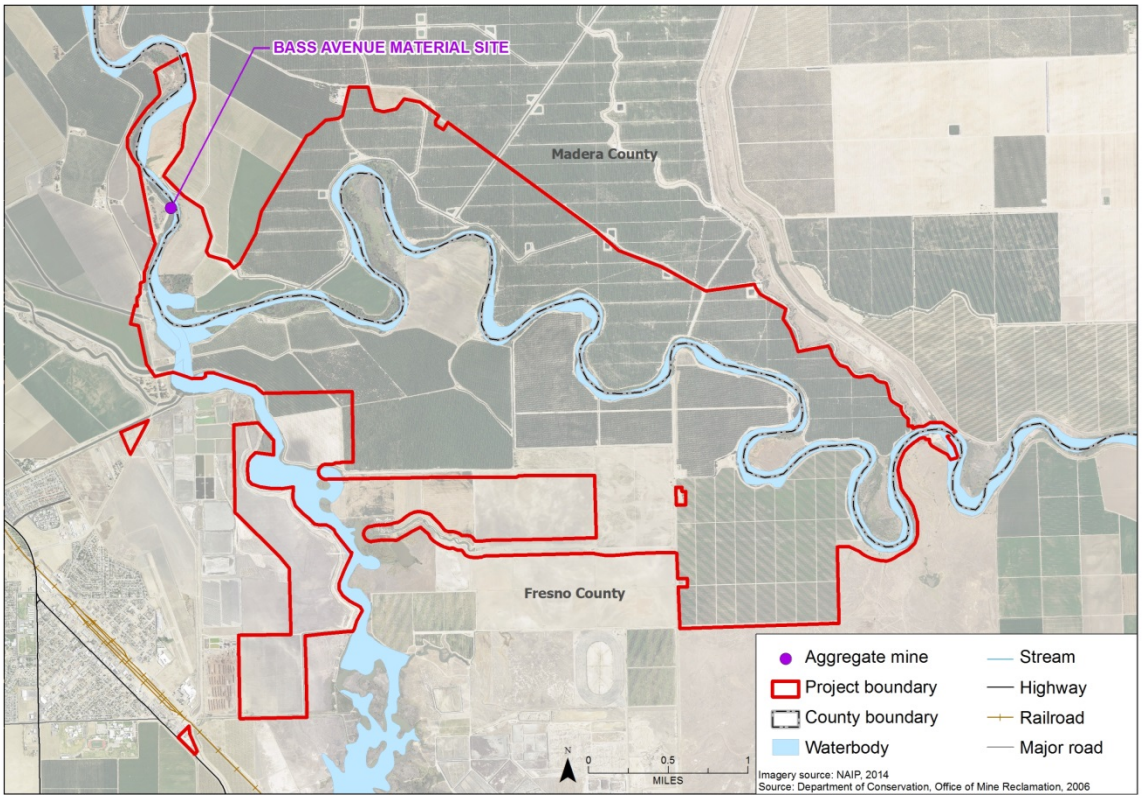


Figure 11-8.
Aggregate Mines in the Project Footprint

Local Mining

Local landowners perform some sand mining near the river channel, leaving pits 10 to 15 feet deep. The pits appear to fill after a single flood control release from Friant Dam. As stated above, one aggregate mine is present in the Project footprint near the downstream end below Mendota Pool (Figure 11-8). No gold is mined in the Project area.

11.1.7 Seismicity and Neotectonics

Both the Sierra and Central Valley geologic provinces continue to be subject to minor tectonic activity. Locally, normal faults are found in the Sierra Nevada foothills, probably because the west, or valley, side of the Sierra block is subsiding faster than uplift of the east side (Bartow 1991). The closest faults of the Foothills Fault System are located about 40 miles north of the Project area and the closest fault strands with activity within the last 700,000 years are more than 70 miles to the north (Jennings and Bryant 2010).

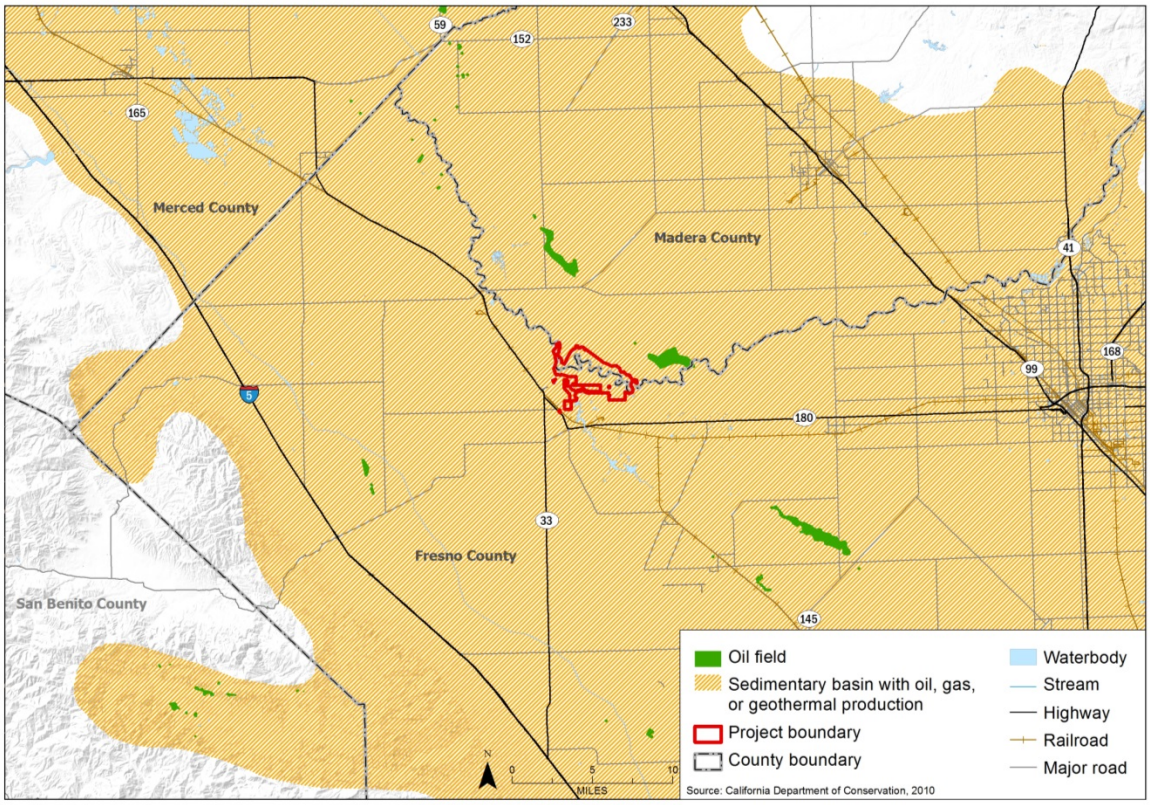


Figure 11-9.
Oil and Gas Fields in the Project Area and Vicinity

San Joaquin Valley Deformation and Subsidence

Regional deposition and deformation patterns of sediments in the San Joaquin Valley have been strongly controlled by recent tectonic activity (Bartow 1991). Quaternary deposits in the San Joaquin Valley are deformed into a broad, asymmetrical trough with its axis 12 to 19 miles west of the current course of the San Joaquin River (Lettis and Unruh 1991). Subsidence is probably due in part to the uplift and tilting of the Sierran block to the east and the Coast Ranges to the west, although the rate of valley subsidence is higher than that of Sierran uplift. Valley subsidence may also be due to sediment loading and compressional down warping or thrust loading from the Coast Ranges (Lettis and Unruh 1991).

Valley subsidence is also known to be occurring in some areas because of groundwater pumping, hydrocompaction, pumping from oil and gas fields, and oxidation of soils with high organic content. Of these factors, aquifer-system compaction by groundwater pumping has caused the largest magnitude and areal extent of land subsidence in the San Joaquin Valley (Sneed et al. 2013). Total subsidence near Mendota Pool reached nearly 9 feet by 2001 as compared to 1935 levels. Subsidence rates were greatest in the 1950s, with an average rate for areas near Mendota Pool of 4.4 inches per year (in/year), between 1953 and 1957. Subsidence rates near Mendota Pool have been reduced in more recent years with subsidence rates averaging 0.44 in/year between 1997 and 2001 and

0.04 in/year between 2003 and 2008 (Sneed et al. 2013). (Subsidence is also discussed in Chapter 13.0, "Hydrology – Groundwater" and Chapter 14.0, "Hydrology - Surface Water Resources and Water Quality.")

Seismicity

Active faults are recognized on the west side of the San Joaquin Valley (Figure 11-10). Most of these faults are part of a series of buried thrust faults (blind faults) that separate the Central Valley from the Coast Ranges. The Great Valley thrust system comprises at least 14 segments over a length of more than 300 miles, although precise locations of surface traces are not well documented because these faults do not rupture to the surface (USGS 1996). The Great Valley thrust system is thought to accommodate a nominal 0.02 to 0.06 in/year of motion (CGS 2002c, USGS 1996). The closest segment to the Project area is the Panoche Segment, Great Valley Segment 10, which is located about 19 miles to the southwest (Figure 11-10).

Seismicity in the Project area and vicinity is dominated by ground shaking related to movement on the buried thrust faults mapped along the west side of the San Joaquin Valley that separate the Sierran Block from the Coast Ranges block (Figure 11-10). The closest of these faults is about 19 miles to the southwest. Therefore, surface fault rupture is not a significant hazard for the Project area. Figure 11-11 shows historic earthquake epicenters in this part of California. No earthquakes with a magnitude greater than 6.0 have occurred within about 38 miles of the site. Figure 11-12 shows that the calculated peak horizontal ground acceleration that has a 2 percent probability of exceedance in 50 years is 0.3 to 0.4 g (expressed as a fraction of the acceleration due to Earth's gravity). The horizontal acceleration pattern shown reflects movement on Coast Ranges faults.

Ground Shaking and Liquefaction Hazards

Although a fault rupture can cause significant damage along its narrow surface trace, earthquake damage is mainly caused by strong, sustained ground shaking (Working Group on California Earthquake Probabilities [WG02] 2003). Seismic ground shaking can cause soils and unconsolidated sediments to compact and settle. If compacted soils or sediments are saturated, pore water pressure increases during earthquake shaking and water can be forced upward to the ground surface, forming sand boils or mud spouts. Increased pore pressures also lead to a reduction in shear strength of the sediments such that they may behave like a viscous fluid. This soil deformation, called liquefaction, may cause minor to major damage to buildings and infrastructure. Earthquake ground shaking hazard potential is low in most of the San Joaquin Valley and Sierra Nevada foothills (California Seismic Safety Commission [CSSC] 2003). Although the San Joaquin Valley is not considered to be a high-risk liquefaction area because of its generally low earthquake and ground shaking hazard risk, it can be assumed that some liquefaction risk exists throughout the valley in areas where unconsolidated sediments and a high water table coincide, such as near rivers and in wetland areas (Merced County 2007).

Hazard Due to Dam Break Inundation

The entire Project area and surrounding portion of the central San Joaquin Valley are in an area of potential inundation if either Friant or Pine Flat dams fail (Figure 11-13).

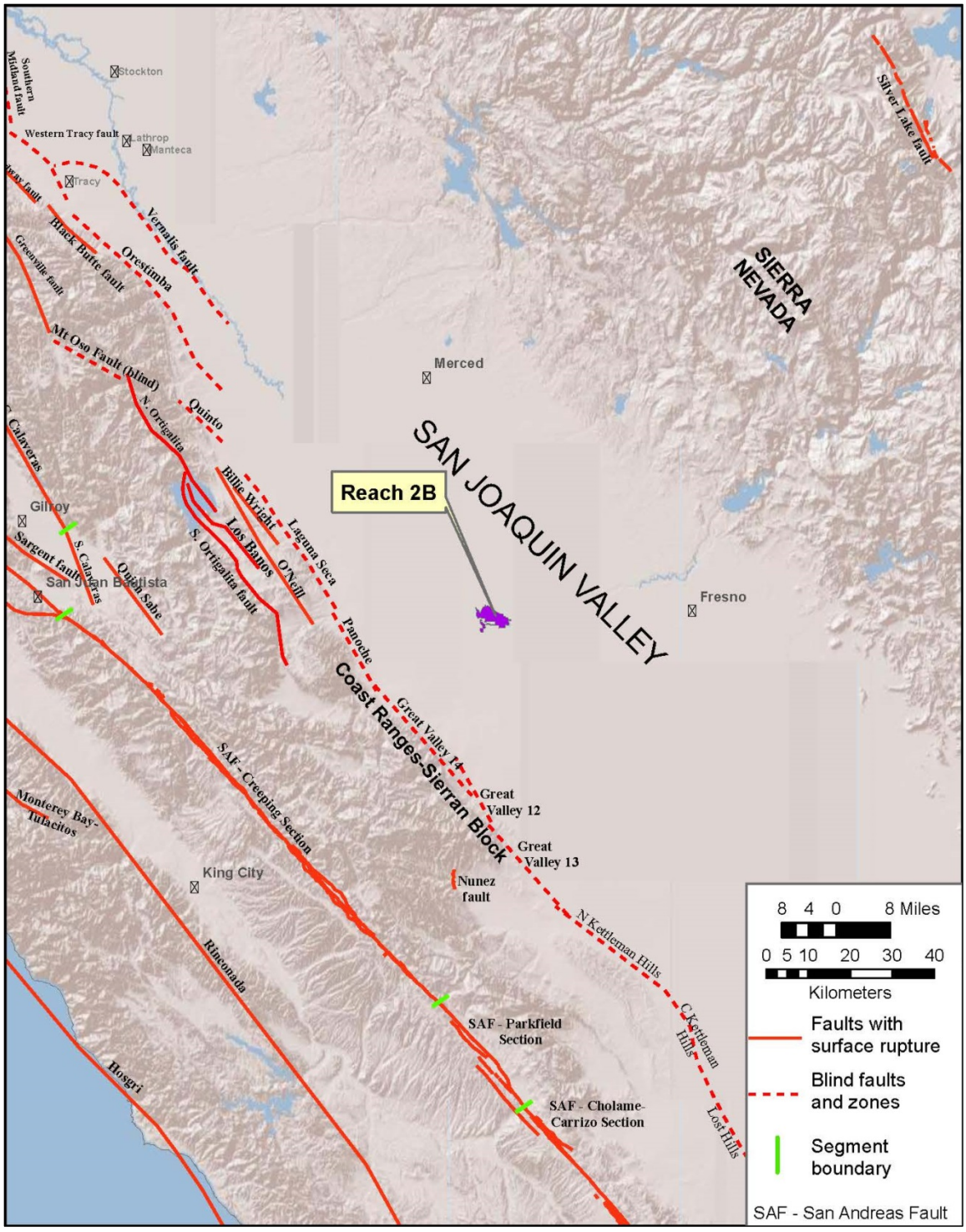


Figure 11-10.
Active Faults in the Project Area and Vicinity

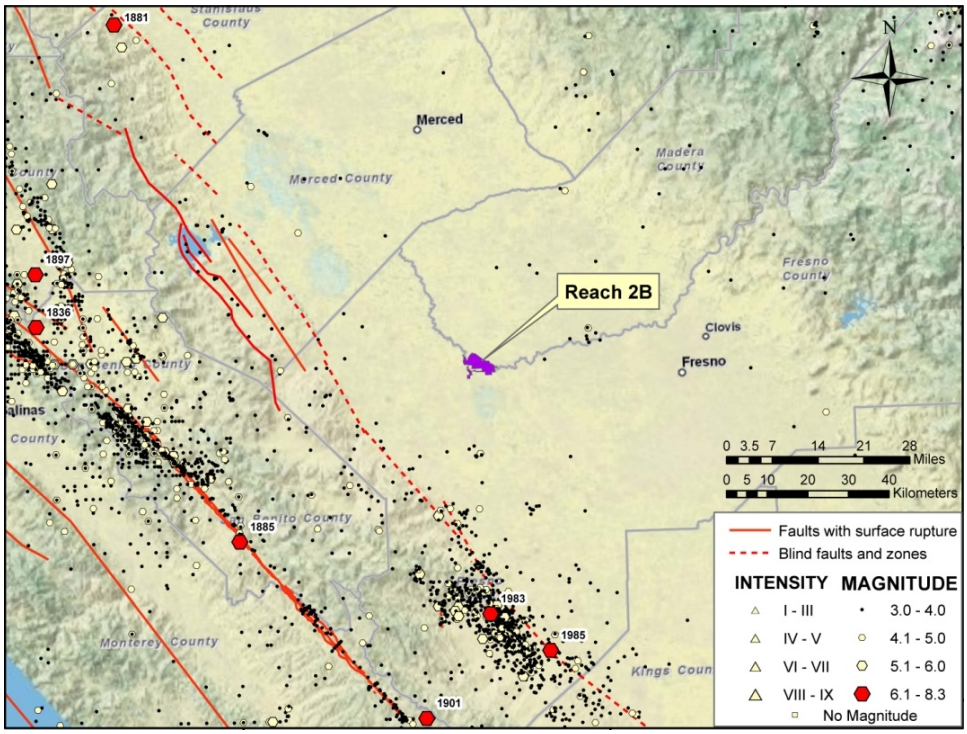
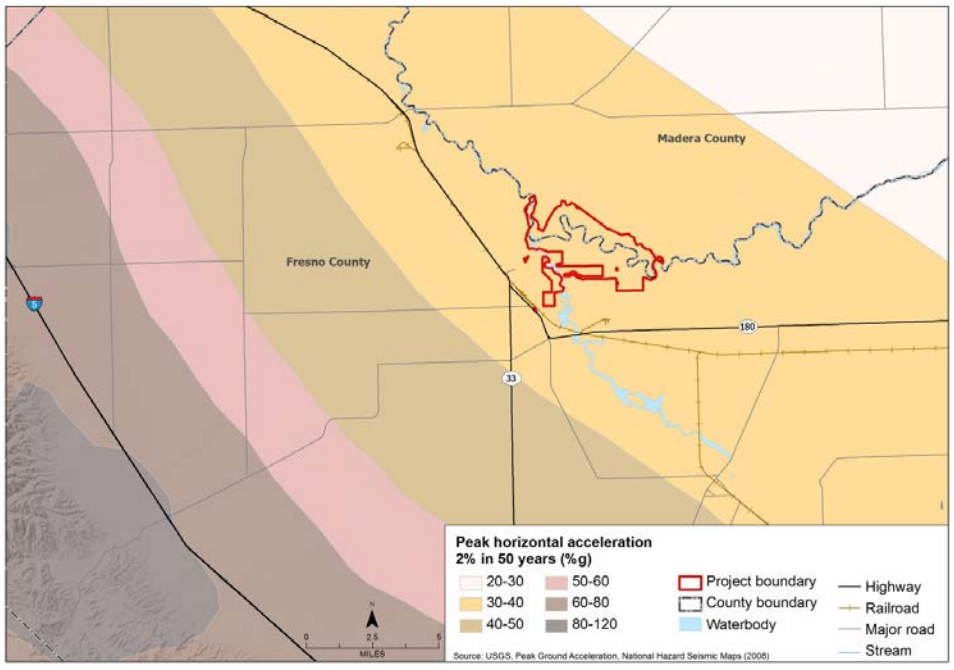


Figure 11-11.
Active Faults and Historical Seismicity in the Project Area and Vicinity (M>= 3.0) 1800-2009



Note: 2 percent probability of exceedance in 50 years

Figure 11-12.
Calculated Peak Ground Acceleration in the Project Area and Vicinity

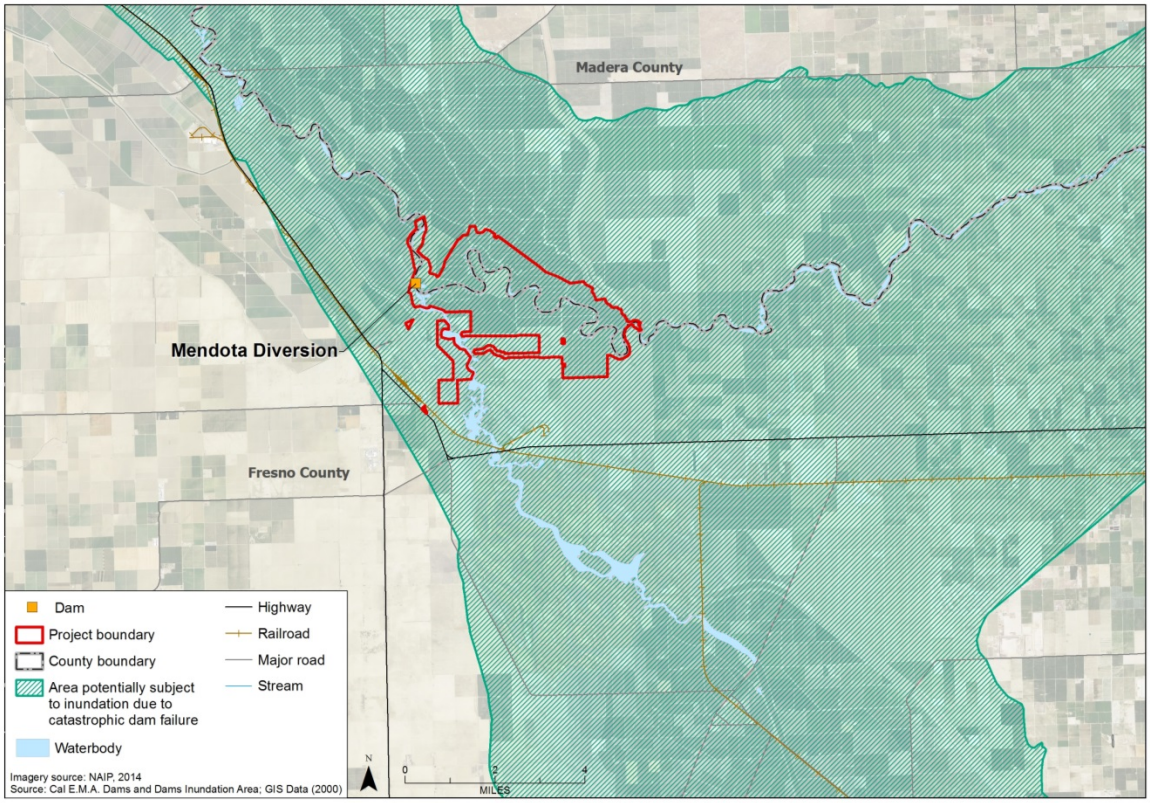


Figure 11-13.
Inundation in the Project Area and Vicinity due to Catastrophic Dam Failure

11.2 Regulatory Setting

This section presents applicable Federal, State, and local laws and regulations associated with geology and soils in the Project area.

11.2.1 Federal

Federal regulations associated with geology and soils in the Project area include the Clean Water Act (CWA) and National Pollutant Discharge Elimination System (NPDES) program, as well as the National Flood Insurance Program, which regulates construction of levees and other flood-related activities.

Clean Water Act Section 402

(See Chapter 14.0, "Hydrology - Surface Water Resources and Water Quality.") CWA Section 402 is directly relevant to excavation and grading activities that may occur during restoration and other activities which may affect geology and soils in the Project area.

National Flood Insurance Program Regulations

(See Chapter 12.0, "Hydrology – Flood Management.") Criteria in 44 Code of Federal Regulations (CFR) 65.10 apply to Mapping of Areas Protected by Levee Systems and to standards for levee design and performance.

11.2.2 State of California

Several codes and acts are in place in the State that may pertain to activities affecting geology and soils in the Project area.

Alquist-Priolo Earthquake Fault Zoning Act

California's Alquist-Priolo Earthquake Fault Zoning Act (Pub. Resources Code, § 2621 et seq.), originally enacted in 1972 as the Alquist-Priolo Special Studies Zones Act, and renamed in 1994, is intended to reduce the risk to life and property from surface fault rupture during earthquakes. The Alquist-Priolo Act prohibits the location of most types of structures intended for human occupancy across the traces of active faults, and strictly regulates construction in the corridors along active faults (earthquake fault zones). However, no active faults are mapped within the Project area (Jennings and Bryant, 2010).

California Building Standards Code

California's minimum standards for the design and construction of buildings, associated facilities, and equipment are given in the California Code of Regulations. Many of the applicable standards are found in the California Building Standards Code (Cal. Code Regs., tit. 24); other standards applicable to buildings are given in Titles 8, 19, 21, and 25 of the California Code of Regulations. Design and construction must satisfy these requirements.

Surface Mining and Reclamation Act

The California Surface Mining and Reclamation Act of 1975 (SMARA) (Pub. Resources Code, § 2710 et seq.) addresses surface mining. Activities subject to SMARA include, but are not limited to mining of minerals, gravel, and borrow material. SMARA applies to an individual or entity that would disturb more than 1 acre or remove more than 1,000 cubic yards of material through surface mining activities, including the excavation of borrow pits for soil material. SMARA also mandated that the State Geologist make an inventory, by county, of mineral resources of statewide and regional significance.

11.2.3 Regional and Local

Local policies and plans in the Project area may relate to implementation of project alternatives potentially affecting geology and soils.

County General Plans

As required by state law, counties in the Project area have developed their own general plans. At a minimum, these documents must address the topics of land use, transportation, housing, conservation, open space, noise, and safety. These documents serve as statements of county goals, policies, standards, and implementation programs for the physical development of a county.

Fresno County General Plan

The Fresno County General Plan Policy Document (Fresno County 2000) outlines several policies for geological resources and/or geological hazards.

- Policy OS-J.9 requires that the location of significant geological resources is considered prior to approval of new development.
- Policy HS-D.3 requires that a soil engineering and geologic-seismic analysis is performed in areas prone to geologic or seismic hazards.
- Policy HS-D.4 requires that structures are designed in accordance with relevant professional standards to minimize damage or loss and to minimize risk to public safety.

Madera County General Plan

The Madera County General Plan Policy Document (Madera County 1995) outlines several policies for geological resources.

- Policy 5.G.1 protects geological resources from incompatible development.
- Policies 6.A.1 to 6.A.4 address seismic and geological hazards.

11.3 Environmental Consequences and Mitigation Measures

11.3.1 Impact Assessment Methodology

The analysis presented in this section is qualitative and based on the general information on geology, soils, mineral resources, seismicity and neotectonics, and geomorphology documented for the region, as previously described. The analysis is also based on a review of published geologic and soils information for the Project area, and professional judgment, in accordance with the current standard of care for geotechnical engineering and engineering geology. The evaluation of impacts on geologic and soil resources considers how proposed changes associated with Project alternatives would affect these resources in Reach 2B.

Impacts to geologic and soil resources that could result from Project construction and operation were evaluated qualitatively based on expected construction practices, materials, locations, and duration of Project construction and related activities, as well as project operations including the effects of modified San Joaquin River flows. The potential loss of geologic and soil resources resulting from implementation of Project alternatives is also evaluated qualitatively. The effect of the Project on the San Joaquin River fluvial geomorphology including bank erosion, channel migration, sedimentation, scour, and changes in the river channel substrate are addressed in Chapter 14, "Hydrology - Surface Water Resources and Water Quality."

Site geology has been evaluated to identify the potential for adverse effects resulting from failure of engineered structures, such as dams, levees, and bifurcations, caused by adverse geologic conditions. The following geologic and soil conditions could affect engineered structures that are part of the Project:

- Unsuitable geologic foundation materials, including compressible soils, expansive soils, and levee under-seepage.
- Erosion of soils from around and beneath structures and their foundations.

- Seismic conditions, including fault rupture, strong ground motion, seismic-induced liquefaction, lateral spreading, settlement, and slope failure.

Impacts to existing infrastructure caused by adverse geologic conditions exacerbated by implementation of the Project were also evaluated qualitatively.

Consistent with the general program-wide design strategies identified in the SJRRP, the analysis assumes the following:

- A geotechnical and engineering geologic study would guide the final site-specific design.
- Earthwork would be designed and conducted in accordance with all relevant requirements of U.S. Department of the Interior, Bureau of Reclamation (Reclamation) design standards including Design Standards No. 3, Chapter 12, General Structural Considerations.
- All structures would be designed consistent with Reclamation design standards or equivalent standards, for example U.S. Army Corps of Engineers (Corps) engineering design standards EM 1110-2-2000 Concrete for Civil Works Structures, EM 1110-2-2100 Stability Analysis of Concrete Structures, EM 1110-2-2705 Structural Design of Closure Structures for Local Flood Protection Projects.
- Expansive soil hazards can be addressed through overexcavation and replacement with nonexpansive fill, amendment, or other measures consistent with Reclamation design standards.
- Corrosive soil hazards can be addressed by overexcavation and replacement with noncorrosive fill, by use of corrosion-protected materials, or by other measures consistent with Reclamation design standards.
- Construction would proceed in accordance with requirements of a Stormwater Pollution Prevention Plan (SWPPP).
- Post-construction soil erosion hazard would be addressed by overexcavation and replacement with non-erosive engineered fill, or by the use of geosynthetics, vegetation, riprap, or other suitable measures consistent with Reclamation design standards.

11.3.2 Significance Criteria

The Project is evaluated in accordance with the Geology and Soils section of Appendix G of the California Environmental Quality Act (CEQA) Environmental Checklist and professional judgment on anticipated impacts on existing geologic and soil resources. Under the National Environmental Policy Act (NEPA), effects must be evaluated in terms of their context and intensity. These factors have been considered when applying the State CEQA Guidelines in Appendix G. Impacts associated with Project implementation have been determined to be significant if they would do any of the following:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault.
  - Strong seismic ground shaking.
  - Seismic-related ground failure, including liquefaction.
  - Landslides.
- Result in substantial soil erosion or the loss of topsoil.
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.
- Be located on expansive soil, as defined in Table 18-1-B of the 1994 Uniform Building Code, creating substantial risks to life or property.
- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State.
- Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.
- Cause changes in conditions resulting in destabilization of existing infrastructure, such as levees, dams, other structures.
- Cause a proposed structure to fail, exposing people, existing infrastructure, and environmental, economic or cultural resources to potential substantial adverse effects.

11.3.3 Impacts and Mitigation Measures

This section provides an evaluation of direct and indirect effects of the Project Alternatives on geologic and soils resources. The analysis considers the short-term construction phase as well as the long-term operational phase. Table 11-4 provides a summary of environmental concerns by resource type or hazard.

This section includes analyses of potential effects relative to No-Action conditions in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. The analysis is organized by Project alternative with specific impact topics numbered sequentially under each alternative.

With respect to geologic and soils resources, the environmental impact issues and concerns are:

1. Effects on Mineral and Soil Resources.
2. Soil Erosion Effects.
3. Adverse Soil Conditions.
4. Adverse Seismicity Effects.

Table 11-4.
Summary of Environmental Concerns

Resource or Hazard	Construction Phase (Short-Term Effects)	Operational Phase (Long-Term Effects)
Mineral resources	None	None
Soil resources	Potential effects	Potential long-term effects
Ground subsidence	None	Project designed for resource/hazard
Expansive soils	None	None
Corrosive soils	None	Project designed for resource/hazard
Collapsible soils	None	None
Difficult excavation	None	None
Soil erosion	Project designed for resource/hazard	Project designed for resource/hazard
Surface fault rupture	None	None
Seismic ground shaking	Unlikely during construction period	Project designed for resource/hazard
Liquefaction	Unlikely during construction period	Project designed for resource/hazard
Lateral spreading	Unlikely during construction period	Project designed for resource/hazard
Seismically induced flooding	Unlikely during construction period	Potential long-term effects
Landslide and rockfall	None	None
Subsurface gas	None	None

Note: Several hazards are unlikely to occur during the relatively short construction period. Nevertheless, they are included because they could theoretically be experienced during construction.

Other geologic and soils resource-related issues covered in the Program Environmental Impact Statement/Report (PEIS/R) are not covered here because they are programmatic in nature and/or are not relevant to the Project area.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. (See Section 2.2.3 for a detailed description of the No-Action Alternative.) However, other proposed actions under the SJRRP would be implemented, including habitat restoration, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these Program-level activities would not achieve full Settlement goals. This section provides an analysis of the No-Action Alternative. The analysis is a comparison to existing conditions, and no mitigation is required for No-Action.

Impact GEO-1 (No-Action Alternative): *Effects on Mineral and Soil Resources*. Under the No-Action Alternative, the Project would not be implemented and there would be no changes to existing geologic and soils conditions in the Project area as a result of construction activities or the placement of new Project facilities. As a result, there would be **no impact** on existing geologic and soils resources due to Project construction. (Potential impacts due to changes in erosion and deposition rates are discussed below.)

Impact GEO-2 (No-Action Alternative): *Soil Erosion Effects*. Under the No-Action Alternative, the Project would not be implemented and there would be no new construction within Reach 2B. The No-Action Alternative would maintain the existing

levee alignments and heights and maximum conveyance would continue to be limited to the existing capacity. As a result, there would be no erosion impacts related to or affecting new Reach 2B structures. However, compared to existing conditions (i.e., pre-Interim Flow conditions as of July 2009), the Program would implement changes to the management of discharges into the San Joaquin River from Friant Dam and these flows could affect sediment transport conditions within Reach 2B. Recent sediment continuity studies have predicted that sand inputs from Reach 2A under Restoration Flows would likely result in net deposition in the upper segment of Reach 2B and potentially down to the Mendota Pool. Net deposition also occurs in Reach 2B under existing conditions (SJRRP 2011, page 10-34).

Compared to existing conditions, soil erosion and deposition rates could change with implementation of Restoration Flows by the Program; however, maximum conveyance in Reach 2B would continue to be limited to the existing capacity and the reach would continue to experience net deposition. As a result, impacts to soil resources as a result of erosion and deposition within Reach 2B would be **less than significant**.

Impact GEO-3 (No-Action Alternative): *Adverse Soil Conditions*. Under the No-Action Alternative, the Project would not be implemented and there would be no new construction within Reach 2B. As a result, potentially corrosive soils or potential ground subsidence within Reach 2B would not impact Project structures. Compared to existing conditions, potential impacts to existing structures due to potentially corrosive soils or potential ground subsidence would remain unchanged and there would be no increase in risk that existing or proposed structures would fail as a result of adverse soil conditions. Therefore, there would be **no impact.**

Impact GEO-4 (No-Action Alternative): *Adverse Seismicity Effects*. Under the No-Action Alternative, the Project would not be implemented and there would be no new construction within Reach 2B. As a result, seismicity effects (e.g., seismic ground shaking, liquefaction, lateral spreading, and seismically induced flooding) would not impact Project structures. Compared to existing conditions, potential impacts to existing structures as a result of seismicity effects would remain unchanged. The likelihood of seismicity affecting the Project area would remain unchanged under this or any of the action alternatives and there would be no increase in risk that existing structures would fail as a result of these potential seismicity effects. Therefore, there would be **no impact**.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would include construction of Project facilities capable of conveying up to 4,500 cfs including a Compact Bypass channel, a new levee system encompassing the river channel with a narrow floodplain, and the South Canal. Other key features include construction of the Mendota Pool Dike (separating the San Joaquin River and Mendota Pool), a fish barrier below Mendota Dam, and the South Canal bifurcation structure and fish passage facility, modification of the San Mateo Avenue crossing, and the removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure. (See Section 2.2.5 for a detailed description of the Alternative A.) No construction activities are proposed at or near Mendota Dam, which falls outside the Project boundary.

Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Impact GEO-1 (Alternative A): *Effects on Mineral and Soil Resources*. Compared to the No-Action Alternative, Project construction for Alternative A would include the Compact Bypass, the South Canal, a 3,000-foot-wide floodplain, and levees along both sides of the floodplain. Currently soils within the footprints of these structures (i.e., the Compact Bypass, South Canal, and narrow floodplain levees) include about 1,410 acres that are farmed. Also, the approximately 3,000-foot-wide floodplain area between the two new levees would be unavailable for farming many current crops under Alternative A, but a portion of the floodplain would be available for annual crops, pasture, or floodplain-compatible permanent crops. Areas where there would be temporary construction impacts include construction office sites, equipment maintenance and parking areas, and material storage areas. It is estimated that approximately 62 acres would temporarily be impacted by this construction; most of these areas are currently in agricultural production. A more detailed discussion of impacts to farming is presented in Chapter 16, "Land Use Planning and Agricultural Resources."

Borrow material would primarily be required for the construction of the levees, but it may also be used in the construction of other structures for foundation or backfill material. Levees may be constructed entirely of local borrow material, a mix of local and imported borrow material, or just imported borrow material. Borrow locations would be determined after a geotechnical exploration of potential local borrow areas is complete (see Section 2.2.4). It is estimated that up to 350 acres of land would be needed for borrow areas. Some of the soils excavated to construct the Compact Bypass and the South Canal might be used for levee construction, and if this is possible, then the size of the borrow areas may be reduced. Excavation of borrow materials would be done in accordance with Reclamation design standards permit requirements.

When comparing Alternative A to existing conditions, impacts to soil resources from construction activities would be similar to those described above (i.e., the comparison of Alternative A to the No-Action Alternative). Because borrow material would be excavated in accordance with Reclamation guidelines designed to be protective of soil resources, impacts to soil resources would be **less than significant**.

Impact GEO-2 (Alternative A): *Soil Erosion Effects*. Compared to the No-Action Alternative, short-term increases in erosion could occur during construction as a result of disturbed soils. However, Reclamation would prepare and implement a SWPPP that complies with applicable Federal NPDES regulations concerning construction activities. Implementation of erosion control best management practices (BMPs) consistent with the Project's construction SWPPP would minimize soil erosion during construction.

Under Alternative A, the long-term flow conveyance capacity of Reach 2B would increase to 4,500 cfs and Reach 2B would receive increased flows that could lead to changes in sediment transport conditions within the new Compact Bypass, the floodplain, and the South Canal. However, standard erosion protection measures, such as revetment, and proper hydraulic engineering design would be implemented to minimize erosion near

Project structures and levees (see Section 2.2.4). Proper engineering design of the new Project features, such as larger culverts that can pass higher flows with reduced scour, would minimize potential increases in soil erosion in the Project area following construction.

When comparing Alternative A to existing conditions, impacts from soil erosion effects would be similar to those described above (i.e., the comparison of Alternative A to the No-Action Alternative). As a result, the impact on erosion would be **less than significant**.

Impact GEO-3 (Alternative A): *Adverse Soil Conditions*. Compared to the No-Action Alternative, the Project design under Alternative A would include new earth structures, such as the Compact Bypass, South Canal, and levees, as well as other smaller reinforced concrete structures such as the South Canal bifurcation structure, fish passage facility, and fish screen; grade control structures in the Compact Bypass; and a fish barrier below Mendota Dam in Reach 3. Adverse soil conditions could negatively affect the long-term stability of Project features.

Under-seepage, water that seeps laterally by travelling under a dam or levee section, can occur when structures are underlain by permeable native soils. This may cause instability in the structures built on these soils. Seepage control measures would be included, as part of the Project, in areas where under-seepage is likely to affect adjacent land uses. Seepage control measures could include slurry walls, interceptor drains, seepage wells, seepage berms, land acquisition (fee title or seepage easements), and other measures that can be implemented within the Project area (see Section 2.2.4).[5]

Other adverse soil conditions within Reach 2B could include soils corrosive to buried concrete and/or steel and soils susceptible to consolidation and the related settlement of overlying structures. Site specific geotechnical exploration, testing, and analysis prior to final design would allow for the characterization of the site soils and appropriate design of all proposed structures such that potentially corrosive soils or subsidence conditions should not impact Project facilities. All design work would be completed in general accordance with Reclamation design standards, applicable design codes, and commonly accepted industry standards (see Section 2.2.4).

When comparing Alternative A to existing conditions, impacts from adverse soil conditions would be similar to those described above (i.e., the comparison of Alternative A to the No-Action Alternative). As a result, impacts of potentially adverse soils within Reach 2B on Project structures would be **less than significant**.

[5] A slurry wall is a construction technique to reinforce areas of soft earth that are near open water or a high groundwater table with a mixture of soil, bentonite, and cement. Interceptor drains are buried perforated pipes which intercept groundwater and redirect it to a discharge point. Because the drains have lower resistance to flow, the groundwater table can be kept artificially low in areas near the pipe. Seepage wells are groundwater wells that are used to pump and draw down the water table where seepage is occurring. Seepage berms are berms placed on the landside of a levee to add additional weight and width to the levee to counteract seepage.

Impact GEO-4 (Alternative A): *Adverse Seismicity Effects*. Compared to the No-Action Alternative, potential impacts to existing structures as a result of seismicity effects would remain unchanged. However, Reach 2B would be modified under Alternative A with the construction of the Compact Bypass, levees on the north and south sides of the expanded floodplain, the South Canal, and several other structures. Each of these structures would be built according to Reclamation design standards, the Corps engineering design standards, or equivalent standards (see Section 2.2.4). As a result, the new structures would be designed as necessary to withstand seismic forces, and foundations would be designed to protect the structure from the deleterious effects of strong ground shaking, liquefaction, and lateral spreading. The potential for flooding related to seismically induced dam failure cannot be lessened through the design of Project facilities; however, the Project would not include development that would put additional people at risk or increase flood risk at occupied structures.

Compared to existing conditions, potential impacts to existing structures as a result of seismicity effects would remain unchanged. The likelihood of seismicity affecting the existing Reach 2B area would remain unchanged under this or any of the other alternatives. Proposed structures would be designed to withstand seismic forces and protect against the deleterious effects of liquefaction and lateral spreading. Therefore, there would be **no impact.**

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B would include construction of Project features capable of conveying up to 4,500 cfs including a Compact Bypass channel, a new levee system with a wide, consensus-based floodplain encompassing the river channel, and the Compact Bypass Bifurcation Structure with fish passage facility. Other key features include construction of a fish passage facility at the San Joaquin River control structure at the Chowchilla Bifurcation Structure, the re-route of Drive 10 ½ (across the Compact Bypass control structure), and removal of the San Mateo Avenue crossing. (See Section 2.2.6 for a detailed description of the Alternative B.) No construction activities are proposed at or near Mendota Dam, which falls outside the Project boundary. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Impact GEO-1 (Alternative B): *Effects on Mineral and Soil Resources*. Compared to the No-Action Alternative, Project construction for Alternative B would include the Compact Bypass and an approximately 4,200-foot-wide floodplain with levees along both sides of the floodplain. Currently soils within the footprints of these two areas (Compact Bypass and wide, consensus-based floodplain levees) include about 1,600 acres that are farmed. A portion of this area would include a mixture of active and passive riparian and floodplain habitat restoration and would no longer be available for farming. Other areas where there would be temporary construction impacts include construction office sites, equipment maintenance and parking areas, and materials storage areas. It is estimated that approximately 60 acres would temporarily be impacted by this construction; most of these areas are currently in agricultural production. A more detailed discussion of impacts to farming is presented in Chapter 16, “Land Use Planning and Agricultural Resources.”

Borrow material would primarily be required for the construction of the levees, but it may also be used in the construction of other structures for foundation or backfill material. Levees may be constructed entirely of local borrow material, a mix of local and imported borrow material, or just imported borrow material. Borrow locations would be determined after a geotechnical exploration of potential local borrow areas is complete; the exploration would determine the suitability of local soils for use as borrow material (see Section 2.2.4). It is estimated that up to 350 acres of land would be needed for borrow areas. Some of the soils excavated to construct the Compact Bypass might be used for levee construction, and if this is possible, then the size of the borrow areas may be reduced. Excavation of borrow materials would be done in accordance Reclamation design standards and permit requirements.

When comparing Alternative B to existing conditions, impacts to soil resources from construction activities would be the same as those described above (i.e., the comparison of Alternative B to the No-Action Alternative). Because borrow material would be excavated in accordance with Reclamation guidelines designed to be protective of soil resources, impacts to soil resources would be **less than significant**.

Impact GEO-2 (Alternative B): *Soil Erosion Effects*. Compared to the No-Action Alternative, short-term increases in erosion could occur during construction as a result of disturbed soils. However, Reclamation would prepare and implement a SWPPP that complies with applicable Federal NPDES regulations concerning construction activities. Implementation of erosion control BMPs consistent with the Project's construction SWPPP would minimize soil erosion during construction.

Under Alternative B, the long-term flow conveyance capacity of Reach 2B would increase to 4,500 cfs and Reach 2B would receive increased flows that could lead to changes in sediment transport conditions within the new Compact Bypass, the floodplain, and adjacent to new structures. However, standard erosion protection measures such as revetment and proper hydraulic engineering design would be implemented to minimize erosion near Project structures and levees (see Section 2.2.4). Proper engineering design of the new Project features would minimize potential increases in soil erosion in the Project area following construction.

When comparing Alternative B to existing conditions, impacts from soil erosion effects would be similar to those described above (i.e., the comparison of Alternative B to the No-Action Alternative). As a result, the impact on erosion would be **less than significant** due to construction of Alternative B.

Impact GEO-3 (Alternative B): *Adverse Soil Conditions*. Compared to the No-Action Alternative, the Project under Alternative B would include new earth structures such as the Compact Bypass and levees, as well as other reinforced concrete structures such as the Compact Bypass Bifurcation Structure, fish passage facility, and grade control structures in the Compact Bypass. Adverse soil conditions could negatively affect the long-term stability of Project features.

Under-seepage, water that seeps laterally by travelling under a dam or levee section, can occur when structures are underlain by permeable native soils. This may cause instability in the structures built on these soils. Seepage control measures (as described above for Impact GEO-3 [Alternative A]) would be included, as part of the Project, in areas where under-seepage is likely to affect adjacent land uses (see Section 2.2.4).

Other adverse soil conditions within Reach 2B could include soils corrosive to buried concrete and/or steel and soils susceptible to consolidation and the related settlement of overlying structures. Site-specific geotechnical exploration, testing, and analysis prior to final design would allow for the characterization of the site soils and appropriate design of all proposed structures such that potentially corrosive soils or subsidence conditions should not impact Project facilities. All design work would be completed in general accordance with Reclamation Design Standards, applicable design codes, and commonly accepted industry standards (see Section 2.2.4).

When comparing Alternative B to existing conditions, impacts from adverse soil conditions would be similar to those described above (i.e., the comparison of Alternative B to the No-Action Alternative). As a result, impacts of potentially adverse soils within Reach 2B on Project structures would be **less than significant**.

Impact GEO-4 (Alternative B): *Adverse Seismicity Effects*. Compared to the No-Action Alternative, potential impacts to existing structures as a result of seismicity effects would remain unchanged. However, Reach 2B would be modified under Alternative B with new construction of the Compact Bypass and bypass control structure, levees on the north and south sides of the expanded floodplain, and other structures. Each of these structures would be built according to Reclamation design standards, the Corps engineering design standards, or equivalent standards (see Section 2.2.4). As a result, the new structures would be designed as necessary to withstand seismic forces, and foundations would be designed to protect the structure from the deleterious effects of liquefaction and lateral spreading. The potential for flooding related to seismically induced dam failure cannot be lessened through the design of Project facilities; however, the Project would not include development that would put additional people at risk or increase flood risk at occupied structures.

Compared to existing conditions, potential impacts to existing structures as a result of seismicity effects would remain unchanged. The likelihood of seismicity affecting the existing Reach 2B area would remain unchanged under this or any of the other alternatives. Proposed structures would be designed to withstand seismic forces and protect against the deleterious effects of liquefaction and lateral spreading. Therefore, there would be **no impact.**

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C would include construction of Project features including Fresno Slough Dam, a new levee system with a narrow floodplain encompassing the river channel, and the Short Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the Short Canal control structure and fish screen, the Chowchilla Bifurcation Structure fish passage facility, modification of San

Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. (See Section 2.2.7 for a detailed description of the Alternative C.) Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Impact GEO-1 (Alternative C): *Effects on Mineral and Soil Resources*. Compared to No-Action, Project construction for Alternative C would include the new Fresno Slough Dam, adjacent Short Canal, floodplain, and levees along both sides of the floodplain. The Fresno Slough Dam would be constructed in an area that is not farmed. Currently soils within the footprint of the new levees and South Canal include about 1,170 acres that are farmed. These areas would no longer be available for farming. The approximately 3,000-foot-wide area between the two new floodplain levees would be revegetated as part of the habitat restoration program and would not be available for farming under Alternative C. Other areas where there would be temporary construction impacts include construction office sites, equipment maintenance and parking areas, and materials storage areas. It is estimated that approximately 62 acres would temporarily be impacted by this construction; most of these areas are currently in agricultural production. A more detailed discussion of impacts to farming is presented in Chapter 16, "Land Use Planning and Agricultural Resources."

Borrow material would primarily be required for the construction of the levees, but it may also be utilized in the construction of other structures for foundation or backfill material. Levees may be constructed entirely of local borrow material, a mix of local and imported borrow material, or just imported borrow material. Borrow locations would be determined after a geotechnical exploration of potential local borrow areas is complete; the exploration would determine the suitability of local soils for use as borrow material (see Section 2.2.4). It is estimated that up to 350 acres of land would be needed for borrow areas. Some of the soils excavated to construct the Short Canal might be used for levee construction, and if this is possible, then the size of the borrow areas may be reduced. Excavation of borrow materials would be done in accordance with Reclamation design standards and permit requirements.

When comparing Alternative C to existing conditions, impacts to soil resources from construction activities would be the same as those described above (i.e., the comparison of Alternative C to the No-Action Alternative). Because borrow material would be excavated in accordance with Reclamation guidelines designed to be protective of soil resources, impacts to soil resources would be **less than significant**.

Impact GEO-2 (Alternative C): *Soil Erosion Effects*. Compared to the No-Action Alternative, short-term increases in erosion could occur during construction as a result of disturbed soils. However, Reclamation would prepare and implement a SWPPP that complies with applicable Federal NPDES regulations concerning construction activities. Implementation of erosion control BMPs consistent with the Project's construction SWPPP would minimize soil erosion during construction.

Under Alternative C, the long-term flow conveyance capacity of Reach 2B would increase to 4,500 cfs and Reach 2B would receive increased flows that could lead to changes in sediment transport conditions within the floodplain and adjacent to structures.

However, standard erosion protection measures such as revetment and proper hydraulic engineering design would be implemented to minimize erosion near Project structures and levees (see Section 2.2.4). Proper engineering design of the new Project features would minimize potential increases in soil erosion in the Project area following construction.

When comparing Alternative C to existing conditions, impacts from soil erosion effects would be similar to those described above (i.e., the comparison of Alternative C to the No-Action Alternative). As a result, the impact on erosion would be **less than significant** due to construction of Alternative C.

Impact GEO-3 (Alternative C): *Adverse Soil Conditions*. Compared to the No-Action Alternative, the Project design under Alternative C would include new earth structures such as the floodplain and levees, as well as reinforced concrete structures such as the Fresno Slough Dam, fish passage facilities at Mendota Dam and Chowchilla Bypass, grade control structures downstream of Mendota Dam, Short Canal, and improved San Mateo Avenue crossing. Adverse soil conditions could negatively affect the long-term stability of Project features.

Under-seepage, water that seeps laterally by travelling under a dam or levee section, can occur when structures are underlain by permeable native soils. This may cause instability in the structures built on these soils. Seepage control measures (as described above for Impact GEO-3 [Alternative A]) would be included, as part of the Project, in areas where under-seepage is likely to affect adjacent land uses (see Section 2.2.4).

Other adverse soil conditions within Reach 2B could include soils corrosive to buried concrete and/or steel and soils susceptible to consolidation and the resultant settlement of overlying structures. Site specific geotechnical exploration, testing, and analysis prior to final design would allow for the characterization of the site soils and appropriate design of all proposed structures such that potentially corrosive soils or subsidence conditions should not impact Project facilities. All design work would be completed in general accordance with Reclamation Design Standards, applicable design codes, and commonly accepted industry standards (see Section 2.2.4).

When comparing Alternative C to existing conditions, impacts from adverse soil conditions would be similar to those described above (i.e., the comparison of Alternative C to the No-Action Alternative). As a result, impacts of potentially adverse soils within Reach 2B on Project structures would be **less than significant**.

Impact GEO-4 (Alternative C): *Adverse Seismicity Effects*. Compared to the No-Action Alternative, potential impacts to existing structures as a result of seismicity effects would remain unchanged. However, Reach 2B would be modified under Alternative C with construction of the Fresno Slough Dam, adjacent Short Canal, and floodplain and levees along both sides of the river, as well as several other structures. Each of these structures would be built according to Reclamation design standards, the Corps engineering design standards, or equivalent standards (see Section 2.2.4). As a result, the new structures would be designed as necessary to withstand seismic forces, and

foundations would be designed to protect the structure from the deleterious effects of liquefaction and lateral spreading. The potential for flooding related to seismically induced dam failure cannot be lessened through the design of Project facilities; however, the Project would not include development that would put additional people at risk or increase flood risk at occupied structures.

Compared to existing conditions, potential impacts to existing structures as a result of seismicity effects would remain unchanged. The likelihood of seismicity affecting the existing Reach 2B area would remain unchanged under this or any of the other alternatives. Proposed structures would be designed to withstand seismic forces and protect against the deleterious effects of liquefaction and lateral spreading. Therefore, there would be **no impact.**

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D would include construction of Project features including Fresno Slough Dam, a new levee system with a wide floodplain encompassing the river channel, and the North Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough Dam fish barrier, the North Canal bifurcation structure, fish passage facility, and fish screen, removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure, removal of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. (See Section 2.2.8 for a detailed description of the Alternative D.) Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Impact GEO-1 (Alternative D): ***Effects on Mineral and Soil Resources*****.** Compared to No-Action, Project construction for Alternative D would include the Fresno Slough Dam, floodplain and levees along both sides of the river and the North Canal. The Fresno Slough Dam would be constructed in an area that is not farmed. Currently soils within the footprint of the new levees and North Canal include about 1,900 acres that are farmed. Also, the approximately 4,200-foot-wide floodplain would be unavailable for farming many current crops under Alternative D, but a portion of the floodplain would be available for annual crops, pasture, or floodplain-compatible permanent crops. Other areas where there would be temporary construction impacts include construction office sites, equipment maintenance and parking areas, and materials storage areas. It is estimated that approximately 62 acres would temporarily be impacted by this construction; most of these areas are currently in agricultural production. A more detailed discussion of impacts to farming are presented in Chapter 16, “Land Use Planning and Agricultural Resources.”

Borrow material would primarily be required for the construction of the levees, but it may also be utilized in the construction of other structures for foundation or backfill material. Levees may be constructed entirely of local borrow material, a mix of local and imported borrow material, or just imported borrow material. Borrow locations would be determined after a geotechnical exploration of potential local borrow areas is complete; the exploration would determine the suitability of local soils for use as borrow material (see Section 2.2.4). It is estimated that up to 350 acres of land would be needed for borrow areas. Some of the soils excavated to construct the North Canal might be used for

levee construction, and if this is possible, then the size of the borrow areas may be reduced. Excavation of borrow materials would be done in accordance with Reclamation design standards and permit requirements.

When comparing Alternative D to existing conditions, impacts to soil resources from construction activities would be similar to those described above (i.e., the comparison of Alternative D to the No-Action Alternative). Because borrow material would be excavated in accordance with Reclamation guidelines designed to be protective of soil resources, impacts to soil resources would be **less than significant**.

Impact GEO-2 (Alternative D): *Soil Erosion Effects*. Compared to the No-Action Alternative, short-term increases in erosion could occur during construction as a result of disturbed soils. However, Reclamation would prepare and implement a SWPPP that complies with applicable Federal NPDES regulations concerning construction activities. Implementation of erosion control BMPs consistent with the Project's construction SWPPP would minimize soil erosion during construction.

Under Alternative D, the long-term flow conveyance capacity of Reach 2B would increase to 4,500 cfs and Reach 2B would receive increased flows that could lead to changes in sediment transport conditions within the expanded floodplain and adjacent to new structures. However, standard erosion protection measures such as revetment and proper hydraulic engineering design would be implemented to minimize erosion near Project structures and levees (see Section 2.2.4). Proper engineering design of the new Project features would minimize potential increases in soil erosion in the Project area following construction.

When comparing Alternative D to existing conditions, impacts from soil erosion effects would be similar to those described above (i.e., the comparison of Alternative D to the No-Action Alternative). As a result, the impact on erosion would be **less than significant** due to construction of Alternative D.

Impact GEO-3 (Alternative D): *Adverse Soil Conditions*. Compared to the No-Action Alternative, the Project design under Alternative D would include new earth structures such as the floodplain, levees, and North Canal, as well as reinforced concrete structures such as the Fresno Slough Dam, fish passage facilities at Mendota Dam, grade control structures downstream of Mendota Dam, and North Canal bifurcation structure, fish passage facility, and fish screen. Adverse soil conditions could negatively affect the long-term stability of Project features.

Under-seepage, water that seeps laterally by travelling under a dam or levee section, can occur when structures are underlain by permeable native soils. This may cause instability in the structures built on these soils. Seepage control measures (as described above for Impact GEO-3 [Alternative A]) would be included, as part of the Project, in areas where under-seepage is likely to affect adjacent land uses (see Section 2.2.4).

Other adverse soil conditions within Reach 2B could include soils corrosive to buried concrete and/or steel and soils susceptible to consolidation and the resultant settlement of

overlying structures. Site specific geotechnical exploration, testing, and analysis prior to final design would allow for the characterization of the site soils and appropriate design of all proposed structures such that potentially corrosive soils or subsidence conditions should not impact Project facilities. All design work would be completed in general accordance with Reclamation Design Standards, applicable design codes, and commonly accepted industry standards (see Section 2.2.4).

When comparing Alternative D to existing conditions, impacts from adverse soil conditions would be similar to those described above (i.e., the comparison of Alternative D to the No-Action Alternative). As a result, impacts of potentially adverse soils within Reach 2B on Project structures would be **less than significant**.

Impact GEO-4 (Alternative D): *Adverse Seismicity Effects*. Compared to the No-Action Alternative, potential impacts to existing structures as a result of seismicity effects would remain unchanged. However, Reach 2B would be modified under Alternative D with the construction of the Fresno Slough Dam, floodplain and levees along both sides of the river, and North Canal, and as well as several other structures. Each of these structures would be built according to Reclamation design standards, the Corps engineering design standards, or equivalent standards (see Section 2.2.4). As a result, the new structures would be designed as necessary to withstand seismic forces, and foundations would be designed to protect the structure from the deleterious effects of liquefaction and lateral spreading. The potential for flooding related to seismically induced dam failure cannot be lessened through the design of Project facilities; however, the Project would not include development that would put additional people at risk or increase flood risk at occupied structures.

Compared to existing conditions, potential impacts to existing structures as a result of seismicity effects would remain unchanged. The likelihood of seismicity affecting the existing Reach 2B area would remain unchanged under this or any of the other alternatives. Proposed structures would be designed to withstand seismic forces and protect against the deleterious effects of liquefaction and lateral spreading. Therefore, there would be **no impact.**

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12.0 Hydrology - Flood Management

This chapter describes the environmental and regulatory settings for flood management and environmental consequences and mitigation, which could potentially be affected by implementation of Project alternatives.

12.1 Environmental Setting

The environmental setting for flood management includes a discussion of flood protection history in the San Joaquin River basin, flood management structures, and flood management operations and conditions. Much of the information presented in this section was obtained from the Upper San Joaquin River Basin Storage Investigation Initial Alternatives Report Information Report, Flood Damage Reduction Technical Appendix (U.S. Department of the Interior, Bureau of Reclamation [Reclamation] and California Department of Water Resources [DWR] 2005) and is summarized below.

12.1.1 Historical Perspective of Flood Protection in the San Joaquin River Basin

Historically, the San Joaquin River had insufficient capacity to carry heavy winter and spring flows generated by precipitation and/or snowmelt within its channel banks. Once flows exceeded channel capacities, the channels overflowed onto the surrounding countryside, forming vast floodplains. Velocities in overbank areas were greatly reduced from velocities in the channels reducing the sediment-carrying capacity of the water allowing material naturally eroded from mountain and foothill areas to drop out of suspension. In this way, over many years, the San Joaquin River built up its bed and formed natural levees composed of heavier, coarser material carried by flood flows. Finer material stayed in suspension much longer and dropped out when overflow water ponded in basins that developed east and west of the river. The higher elevation land formed by the natural levees attracted the first settlements in the Central Valley. In the early 1800s, settlers and Native Americans described the Sacramento and San Joaquin rivers as “miles wide” during flooding.

Early Flood Protection

Initial flood protection in the Central Valley developed in a piecemeal fashion with the construction of levees to protect local areas from flooding. Levees were typically constructed in response to a past flood, with little or no coordination between different localities. As the private levee system developed, the protection afforded by individual levees decreased because of the increased heights of floodwaters constrained between the levees. The increased flood danger led to competition between landowners to continually raise and strengthen levees by stages to protect local areas and direct floodwaters elsewhere.

By the early 1900s, it was evident that local efforts would not be adequate to provide flood protection to agricultural lands in the Sacramento River and San Joaquin River basins. In 1920, Colonel Robert Marshall, chief geographer for the U.S. Geological Survey (USGS), proposed a major water storage and conveyance plan to transfer water from Northern California to meet urban and agricultural needs of central and Southern California. This plan ultimately provided the framework for development of the Central Valley Project (CVP). Under the Marshall Plan, a dam would be constructed on the San Joaquin River near Friant to divert water north and south to areas in the eastern portion of the San Joaquin Valley, and provide flood protection to downstream areas. The diverted water would be a supplemental supply to relieve some of the dependency on groundwater that had led to overdraft in areas of the eastern San Joaquin Valley. Water in the Sacramento Valley would be collected, stored, and transferred to the San Joaquin Valley by a series of reservoirs, pumps, and canals.

In 1933, the California State Legislature approved the Central Valley Project Act, which authorized construction of initial features of the CVP, including Shasta Dam; Friant Dam; power transmission facilities from Shasta to Tracy; and the Contra Costa, Delta-Mendota, Madera, and Friant-Kern canals. However, the Great Depression prevented the State from financing the project so the State appealed to the Federal Government for assistance in constructing the CVP.

Congress appropriated funds and authorized construction of the CVP and construction began on October 19, 1937, with the Contra Costa Canal. Construction of Shasta Dam began in 1938 and was completed for full operation in 1949. Friant Dam, on the San Joaquin River, was also completed in 1949.

The Flood Control Act of 1944 authorized the Lower San Joaquin River and Tributaries Project. The project included constructing levees on the San Joaquin River below the Merced River, Stanislaus River, Old River, Paradise Cut, and Camp Slough. Construction was initiated on the Lower San Joaquin River and Tributaries Project in 1956. The Chowchilla and Eastside bypasses were constructed by the State as part of the Lower San Joaquin River Project.

12.1.2 Flood Management Structures

Friant Dam

Friant Dam is the principal flood damage reduction facility on the San Joaquin River and is operated to maintain combined releases to the San Joaquin River at or below a flow objective of 8,000 cubic feet per second (cfs). Several flood events, as described below, in the past few decades have resulted in flows greater than 8,000 cfs downstream from Friant Dam and, in some cases, flood damages resulted.

The existing Friant Dam is a 319-foot-tall concrete gravity dam with a crest length of 3,488 feet and a crest width of 20 feet. Millerton Lake, formed by Friant Dam, has a volume of 524 thousand acre-feet (TAF). The dam serves the dual purposes of storage for irrigation and flood management. The minimum operating storage of Millerton Lake is 130 TAF, resulting in active available conservation storage of about 390 TAF. The

minimum operating storage allows for diversion from dam outlets to the Friant-Kern Canal, Madera Canal and the San Joaquin River. During the rainy season of October through March up to 170 TAF of available storage space must be maintained for management of rain floods.

San Joaquin River

Except for a small area to the west and south of Fresno Slough, the Project area is located in a Federal Emergency Management Agency (FEMA) Special Flood Hazard Zone A (no base flood elevations have been determined). The area adjacent to Fresno Slough is designated as Zone AO (1-3 feet of flood depth).

Chowchilla Bypass and Chowchilla Bifurcation Structure

The flood control structure most relevant to Reach 2B is the Chowchilla Bypass and Chowchilla Bifurcation Structure, owned by DWR and the Central Valley Flood Protection Board (CVFPB) for the State of California. The Chowchilla Bypass begins at the Chowchilla Bifurcation Structure in the San Joaquin River and runs northwest, parallel to the San Joaquin River, to the confluence of the Fresno River, where the Chowchilla Bypass ends and essentially becomes the Eastside Bypass. The design channel capacity of the Chowchilla Bypass is 5,500 cfs. The bypass is constructed in highly permeable soils, and much of the initial flood flows infiltrate and recharge groundwater. The Chowchilla Bifurcation Structure is a gated structure that controls the proportion of flood flows between the Chowchilla Bypass and the San Joaquin River Reach 2B. The bifurcation structure has a drop (plunge pool) on the downstream side in both the San Joaquin River and Chowchilla Bypass, and has no fish passage facilities. The Chowchilla Bifurcation Structure is operated to keep flows in Reach 2B at a level less than 2,500 cfs because of channel design capacity limitations. Therefore, operating rules for the Chowchilla Bifurcation Structure are based on initial flow to the San Joaquin River and initial flow to the Chowchilla Bypass (McBain and Trush 2002). The intended design capacities for the various sections of the San Joaquin River reaches in the Project area are described in Table 12-1.

Mendota Dam

Mendota Dam is located at the confluence of the San Joaquin River and Fresno Slough. Mendota Pool is a small reservoir, with approximately 8,000 acre-feet of storage, created by Mendota Dam. The Mendota Pool does not provide any appreciable flood storage. The water surface elevation in the pool is maintained by a set of gates and flashboards that are manually opened/removed in advance of high-flow conditions. This process lowers the water level in the pool for passing high flows to reduce seepage impacts to adjacent lands, but hinders distribution of flows into the canals.

Over time, the Mendota Pool has partially filled with sediment during infrequent high-flow releases from Friant Dam. During times of high flows, some unknown portion of this sediment is able to flush and route downstream when flashboards have been removed, restoring much of the Mendota Pool storage capacity. If the flashboards are not removed before a high-flow event from either the San Joaquin River or Kings River via Fresno Slough, the increased water surface elevations cause seepage problems on upstream and adjacent properties. Additionally, there have been recurring problems with

water seeping under Mendota Dam, threatening the structural integrity of the dam. The Mendota Pool is drained every other year to inspect Mendota Dam footings.

Table 12-1.
Design Capacities of San Joaquin River and Chowchilla Bypass Within the Project Area and Vicinity

Reach	Upstream Extent	Downstream Extent	Levee Type[a]	Design Capacity (cfs)[b]
Reach 2A	Gravelly Ford	Chowchilla Bifurcation Structure	Project	8,000
Reach 2B	Chowchilla Bifurcation Structure	Mendota Dam	Non-project	2,500
Reach 3	Mendota Dam	Sack Dam	Non-project	4,500
Reach 4A	Sack Dam	Sand Slough Control Structure	Non-project	4,500
Kings River North	Fresno Slough Bypass	Mendota Pool	Non-project	4,750
Chowchilla Bypass	Chowchilla Bifurcation Structure	Confluence with Fresno River and Eastside Bypass	Project	5,500
Eastside Bypass	Fresno River	Sand Slough Bypass	Project	10,000-17,000
Sand Slough Bypass	Sand Slough Control Structure	Eastside Bypass	Project	3,000

Notes:
[a] Project levees are those levees constructed to Federal standards as part of a Federal flood control project, in this case, the Lower San Joaquin River Flood Control Project, and non-project levees are those constructed by individual landowners to protect site-specific properties.
[b] Design capacity is defined by the Corps as the amount of water that can pass through reaches of the San Joaquin River and Chowchilla Bypass with a levee freeboard of 3 feet.
Key:
cfs = cubic feet per second

Fresno Slough and the Kings River

Fresno Slough connects the Kings River to the San Joaquin River through the James Bypass. The James Bypass is a leveed channel beginning in the lower Kings River basin and runs northwest to Fresno Slough. The Fresno Slough delivers water to the south from Mendota Pool during irrigation season, and delivers water to the Mendota Pool and San Joaquin River from the Kings River when the Kings River is flooding. Due to this flood inflow, Kings River system operations influence operations on the San Joaquin River at Chowchilla Bifurcation Structure, Mendota Pool, and downstream.

Levees

There are two classes of levees and dikes along the San Joaquin River near Reach 2B: (1) those associated with the Lower San Joaquin River Flood Control Project (project levees), and (2) those constructed by individual landowners to protect site-specific properties, and thus not associated with the Lower San Joaquin River Flood Control Project (non-project levees). There are only non-project levees in Reach 2B; however, project levees exist along the lower portion of Reach 2A and along the entire length of the Chowchilla Bypass.

The San Joaquin River Flood Control Project consists of a parallel conveyance system: (1) a leveed bypass system on the east side of the San Joaquin Valley, and (2) a leveed flow conveyance system in the San Joaquin River. The main stem of the San Joaquin River levee system is composed of approximately 192 miles of project levees and various non-project levees located upstream from the Merced River confluence. Project levees are levees constructed as part of the San Joaquin River Flood Control Project by the Corps, and occur in Reach 2A downstream from Gravelly Ford and extend downstream to the Chowchilla Bifurcation Structure. There are no project levees in Reach 2B. Information on dimensions of estimated channel capacities for locally constructed levees is difficult to obtain and, in some cases, is currently unavailable.

Figure 12-1 shows the levee flood protection zones for the San Joaquin River. Under California Water Code section 9110, subdivision (b), "Levee Flood Protection Zone" means the area, as determined by the CVFPB or DWR that is protected by a project levee. DWR delineated the levee flood protection zones by estimating the maximum area that may be flooded and where flood levels could exceed 3 feet deep if a project levee fails with flows at maximum capacity that may reasonably be conveyed. Reach 2B is not protected by project levees. However, the levee flood protection zone map shown in Figure 12-1 indicates that the entire Project area is subject to inundation with some areas subject to flooding greater than 3 feet if a levee was to fail.

12.1.3 Flood Management Operations and Conditions

The following sections contain information about flood management operations in the Project area and vicinity.

San Joaquin River

The 8,000 cfs objective flow from Friant Dam is generally considered to be a safe carrying capacity, though some flood damages to adjacent land developments can occur when objective flows are passed. These damages can occur because of levee under-seepage and through-seepage, and backwater effects on local storm drainage systems. Design capacity is defined by the Corps as the amount of water that can pass through reaches of the San Joaquin River with a levee freeboard of 3 feet. Design capacity was intended to provide protection against a 50-year storm (McBain and Trush 2002). The intended design capacity of Reach 2B is 2,500 cfs with 3-foot freeboard.

In all cases, water from the Kings River system has priority to use available capacity in the San Joaquin River below the Mendota Pool. When flood flows are below channel capacities, the Lower San Joaquin Levee District (LSJLD) has the latitude to best use the design capacities of the Lower San Joaquin River Flood Control Project.

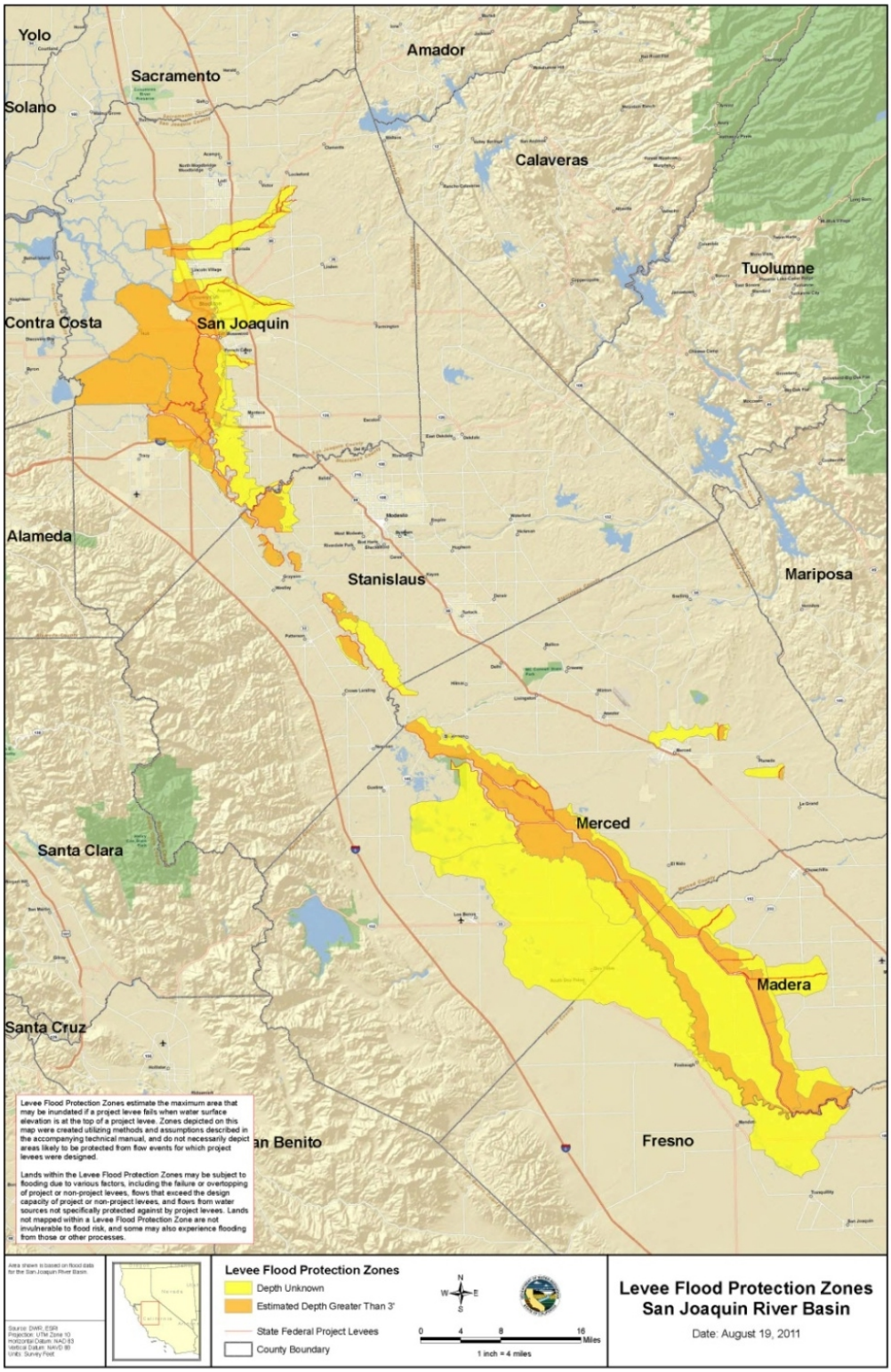


Figure 12-1.
Levee Flood Protection Zones in the San Joaquin River Basin

The following operation and maintenance guidelines describe how the system is operated (Reclamation Board 1969).

- The first increment of flow down the San Joaquin River may be routed through either the San Joaquin River or the Chowchilla Bypass. Up to 2,500 cfs would normally be routed through the San Joaquin River insofar as it does not exceed the capacity of the river when added to the releases from the Kings River. Up to 5,500 cfs would be passed through the Chowchilla Bypass Bifucation Structure. A total flow of 8,000 cfs would normally be divided with 2,500 cfs passing to the river and 5,500 cfs passing to the Chowchilla Bypass.
- Should the flows exceed 8,000 cfs at the control structures or 10,000 cfs at the latitude of Mendota (i.e., the total flow in the San Joaquin River, via Reach 2 and James Bypass/Fresno Slough, and the Chowchilla Bypass at the latitude of Mendota), the LSJLD would operate the control structures at their own discretion with the objective of minimizing damage to the flood control project and protected area.

Major Recent Floods

The following flood event descriptions as reported in Reclamation and DWR (2005) are drawn from the Corps report (Corps 1999). Between 1900 and 1997, the Sacramento River and San Joaquin River basins experienced 13 destructive floods each located in a different portion of the Central Valley. The most recent floods (1983, 1986, 1995, and 1997) caused extensive damage in both the Sacramento River and San Joaquin River basins and raised questions about the adequacy of the current flood management systems and land use in the floodplains. In response to these floods, Congress authorized the Corps in 1997 to undertake a comprehensive study of the flood damage reduction facilities in the Sacramento River and San Joaquin River basins, and to prepare a summary of recent flood events.

Flood of 1955. The flood of 1955 occurred in December, was centered north of Friant Dam, and was more intense in the northern portions of the San Joaquin Valley and in the Sacramento Valley. Before the start of the flood, Millerton Lake was well below flood management space and, as a result, flows on the San Joaquin River were completely controlled by Friant Dam. The peak flow release from Friant Dam for this storm occurred on January 5, 1956, at 7,120 cfs. The flow stayed high for about 6 weeks.

Flood of 1967. Above-normal precipitation that occurred continuously from December 1966 through March 1967 resulted in the flooding of 35,000 acres of the San Joaquin River basin. A record-breaking storm in early December 1966 resulted in very high runoff from the San Joaquin River. The San Joaquin River above Millerton Lake experienced high runoff during early December with a maximum mean daily inflow of 18,450 cfs to the lake. The release from Millerton during this event was about 5,000 cfs and lasted about 1 week. A vast snowmelt from April to July resulted in significant flood damage from flooding in the lower portions of the Fresno and Chowchilla rivers. Nearly all of the flooded areas were cropland, improved pasture, or grazing land. Releases from Millerton climbed to about 8,000 cfs in the first week of April and remained there until the beginning of June. Flow did not return to normal until mid-July.

Flood of 1983. Water year 1983 was one of the wettest on record in California, a result of El Niño weather conditions. Northern and Central California experienced moderate flooding incidents from November through March because of numerous storms. In early May, snow water content in the Sierra Nevada exceeded 230 percent of normal, and the ensuing runoff resulted in approximately four times the average volume for Central Valley streams. In the San Joaquin River basin, levee breaks caused flooding at four locations along the San Joaquin River. Estimated damages exceeded $324 million in the San Joaquin River basin (Corps 1999). Releases from Millerton started to increase in the beginning of November reaching over 12,000 cfs in July, after which they returned to more normal conditions.

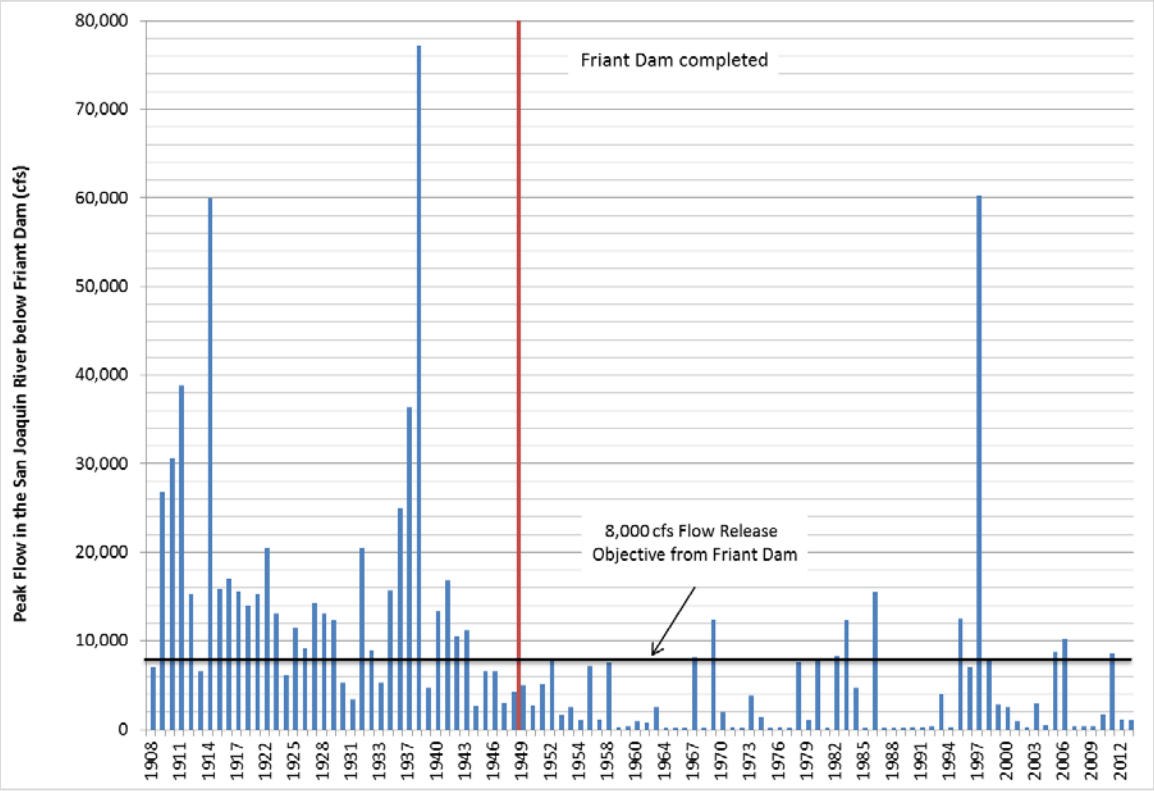
Flood of 1986. Flooding in 1986 resulted from a series of four storms over a 9-day period during February. Rains from the first three storms saturated the ground and produced moderate to heavy runoff before the arrival of the fourth storm. Peak daily inflow to Millerton Lake was about 20,800 cfs. Estimated damages exceeded $15 million in the San Joaquin River basin (Corps 1999). The peak flow from Millerton was 15,500 cfs on February 18. Flows started to return to normal in about mid-April.

Flood of 1995. El Niño conditions in the Pacific forced major storm systems directly into California during much of the winter and early spring of 1995. The largest storm systems hit California in early January and early March. The major brunt of the January storms hit the Sacramento River basin and resulted in small stream flooding primarily because of storm drainage system failures. The March 1995 storms were concentrated on the coastal range, and caused high flows in some of the west side tributaries to the San Joaquin River basin. Peak daily inflow to Millerton Lake was about 23,700 cfs. In total, estimated flood damages in 1995 exceeded $193 million in the San Joaquin River basin (Corps 1999). The peak release from Millerton was 12,500 cfs on March 11, but releases were high from the first week in March to almost August.

Flood of 1997. December 1996 was one of the wettest Decembers on record in the Central Valley. Watersheds in the Sierra Nevada already were saturated by the time three subtropical storms added more than 30 inches of rain in late December 1996 and early January 1997. The third and most severe of these storms lasted from December 31, 1996, through January 2, 1997. Rain in the Sierra Nevada caused record flows that overwhelmed the flood management system in the San Joaquin River basin. Peak daily inflow to Millerton Lake was about 51,800 cfs, with a peak hourly inflow of about 95,000 cfs. Peak daily outflows to the San Joaquin River from Friant Dam were estimated at 37,500 cfs, with a peak hourly outflow of 62,900 cfs. Dozens of levees failed throughout the river system and widespread flooding ensued. Estimated damages exceeded $223 million in the San Joaquin River basin (Corps 1999).

Since 1997 there have been four large flow releases from Friant Dam. In the beginning of June 1998, the flow increased to about 8,000 cfs and remained there for about 3 weeks then slowly decreased to normal levels. In mid-May 2005, the releases from Friant Dam increased to almost 9,000 cfs and remained there for about 2 weeks before dropping to more normal levels. In the beginning of April 2006, the releases increased to 10,000 cfs and remained high for several months decreasing to normal levels in July. In the

beginning of April 2011, the releases increased over 8,000 cfs and remained high for several weeks. Releases peaked again in the end of June and the beginning of July 2011, reaching up to 8,500 cfs. Figure 12-2 shows the peak annual flows below Friant Dam (or at that location before Friant Dam was constructed). Since the dam was constructed in 1949 there have been only 12 events with releases from Friant Dam that exceeded the maximum flow objective of 8,000 cfs. Some of these events lasted many days or months.



Dates before construction of the Dam were collected in the river at the same location.

Figure 12-2.
Peak Annual Flows in the San Joaquin River below Friant Dam

12.1.4 Flood Management Agencies

Federal Emergency Management Agency

Congress established the National Flood Insurance Program to address both the need for flood insurance and the need to lessen the devastating consequences of flooding. FEMA works closely with State and local officials to identify flood hazard areas and flood risks. Floodplain management requirements within high-risk areas, known as Special Flood Hazard Areas, are designed to prevent new development from increasing the flood threat, and to protect new and existing buildings from anticipated flood events. Because the levees in Reach 2B are not authorized flood control levees, the Project area is within a FEMA-designated 100-year flood hazard zone.

U.S. Army Corps of Engineers

The Corps has nationwide responsibility for flood management. In California, flood management on the San Joaquin River system and other rivers is a combination of the Corps, Reclamation, State, and private projects; all operated under the Corps official flood management plans. The Corps has emergency authority to fight any flood to protect life and property and to rehabilitate Federal flood management facilities that are maintained by State and local entities.

Central Valley Flood Protection Board

The CVFPB was established to accomplish the following:

- Control flooding along the Sacramento and San Joaquin rivers and their tributaries, in cooperation with the Corps. This includes working with all permit requests for construction of improvements of any nature within the limits of a Federal project right-of-way; permit requests are referred to the Corps District Engineer for review (in accordance with the provisions of 33 Code of Federal Regulations (CFR) Section 208.10).
- Cooperate with various agencies of the Federal, State, and local governments in establishing, planning, constructing, operating, and maintaining flood control works.
- Maintain the integrity of the existing flood control system and designated floodways through the CVFPB's regulatory authority by issuing permits for encroachments.

California Department of Water Resources

DWR established the Division of Flood Management in November 1977, although flood forecasting and flood operations had been integral functions of the DWR and its preceding agencies for about a century. Today, the functions of statewide flood forecasting, flood operations, and other key flood emergency response activities are the primary missions of the Division of Flood Management Hydrology and Flood Operations Office. Other components of the Division of Flood Management include Flood Projects Office, Flood Maintenance Office, FloodSAFE Program Management Office, and the Central Valley Flood Planning Office.

The Division of Flood Management, among several others, is carrying out the work of DWR's California FloodSAFE Initiative program, which partners with local, regional, State, Tribal, and Federal officials in creating sustainable, integrated flood management and emergency response systems throughout California. DWR is responsible for inspecting Federal project levees and has an obligation to prepare a State Plan of Flood Control and Central Valley Flood Protection Plan. Both plans are required to incorporate any modifications to the flood management system anticipated under the Settlement. In June 2012 the CVFPB adopted the 2012 Central Valley Flood Protection Plan. The plan lays out the goals and objectives to flood protection including ecosystem integration over the following 5 years and includes a vision for long-term flood management over the next 20 to 25 years (DWR 2012).

Lower San Joaquin Levee District

The LSJLD was created in 1955 by a special act of the State Legislature to operate, maintain, and repair levees, bypasses, and other facilities built in connection with the Lower San Joaquin River Flood Control Project. The district encompasses approximately 468 square miles (300,000 acres) in Fresno, Madera, and Merced counties. LSJLD is responsible for operation and maintenance and emergency management of State flood control facilities within the district boundaries including 191 miles of levees, channel bottoms, and flood management facilities. The LSJLD is not responsible for operation and maintenance of privately owned levees. Operations and maintenance activities include vegetation management activities, sediment management and removal activities, cleaning of screens and trash racks on facilities, opening and closing gates and flap gates in the bypass systems, and flood watch. Important facilities maintained by the district include the Chowchilla Bypass, the Eastside Bypass, and the Mariposa Bypass.

12.2 Regulatory Setting

The Federal, State, and regional and local regulatory setting of the Project as it pertains to flood management is described below.

12.2.1 Federal

The Federal regulatory setting describes Executive Order (EO) 11988, and Section 14 of the Rivers and Harbors Act (RHA).

Executive Order 11988 (Flood Hazard Policy)

EO 11988 is a flood hazard policy for all Federal agencies that manage Federal lands, sponsor Federal projects, or provide Federal funds to State or local projects. It requires that all Federal agencies take necessary action to reduce the risk of flood loss; restore and preserve the natural and beneficial values served by floodplains; and minimize the impacts of floods on human safety, health, and welfare. Specifically, EO 11988 dictates that all Federal agencies avoid construction or management practices that would adversely affect floodplains unless that agency finds no practical alternative, and the proposed action has been designed or modified to minimize harm to or within the floodplain.

Rivers and Harbors Act (Section 408)

Section 14 of the RHA (commonly known as Section 408) was approved by the Federal Government on March 3, 1899 (33 United States Code 408). The act provides that the Secretary of the Army, on the recommendation of the Chief of Engineers, may grant permission for the temporary occupation or use of any sea wall, bulkhead, jetty, dike, levee, wharf, pier, or other work built by the United States. Major alterations to a Federal flood control project, including alterations to channels and levees that change the Federal project's authorized geometry or the hydraulic capacity, would require a Corps permit.

12.2.2 State of California

The State regulatory setting describes the Central Valley Flood Protection Act of 2008 and the CVFPB Encroachment Permit.

Central Valley Flood Protection Act of 2008

The Flood Protection Act of 2008 has strengthened flood protection regulations in California. This legislation requires DWR and CVFPB to prepare and adopt a Central Valley Flood Protection Plan. The legislation also establishes certain flood protection requirements for local land use decision-making based on the Central Valley Flood Protection Plan. This law sets new standards for flood protection for the San Joaquin Valley area. It requires an urban level of flood protection necessary to withstand a 1 in 200 chance of a flood event occurring in any given year (200-year flood) for areas developed or planned to have a population of at least 10,000. Under the Central Valley Flood Protection Plan, the State is also considering structural and nonstructural options for rural-agricultural and small communities for protection from a 100-year (1% annual chance) flood.

Central Valley Flood Protection Board Encroachment Permit

Under Title 23 of the California Code of Regulations, the CVFPB issues encroachment permits to maintain the integrity and safety of flood control project levees and floodways that were constructed according to flood control plans adopted by CVFPB or the California Legislature. The CVFPB has jurisdiction over the levee section, the waterward area between project levees, a 10-foot-wide strip adjacent to the landward levee toe, within 30 feet of the top of the banks of unleveed project channels, and within designated floodways adopted by the CVFPB. Activities outside of these limits that could adversely affect the flood control project also fall under the jurisdiction of the CVFPB. In accordance with the provisions of Title 33, CFR Section 208.10, all permit requests for construction of improvements of any nature within the limits of a Federal project right-of-way would be referred to the Corps District Engineer for review.

Project-level actions will require work along the San Joaquin River in areas that may be subject to Title 23 because the river is managed for flood control and thus contains features subject to the jurisdiction of CVFPB. The San Joaquin River is a regulated stream and the proposed action could have an effect on the flood control functions of project levees just east and north of the Chowchilla Bifurcation Structure or downstream project levees. Project proponents will secure encroachment permits, as needed, to satisfy Title 23 before performing any work along relevant reaches of the San Joaquin River that contain flood control features subject to CVFPB jurisdiction.

12.2.3 Regional and Local

Local plans and policies include those designated in county general plans.

Fresno County General Plan

The Fresno County General Plan Policy Document (Fresno County 2000) outlines several policies for flood management.

- Policy HS-C.2 requires that the design and location of dams and levees be in accordance with applicable design standards and specifications and accepted design and construction practices.
- Policy HS-C.6 indicates that the County shall promote flood control measures that maintain natural conditions within the 100-year floodplain of rivers and streams

and, to the extent possible, combine flood control, recreation, water quality, and open space functions.

- Policy HS-C.7 indicates that the County shall continue to participate in the Federal Flood Insurance Program by ensuring compliance with applicable requirements.
- Policy HC-C.10 required that placement of structures and/or floodproofing be done in a manner that will not cause floodwaters to be diverted onto adjacent property, increase flood hazards to other property, or otherwise adversely affect other property.

Madera County General Plan

The Madera County General Plan Policy Document (Madera County 1995) outlines several policies for flood management.

- Policy 6.B.1 requires flood-proofing of structures in areas subject to flooding.
- Policy 6.B.3 restricts uses in designated floodways to those that are tolerant of occasional flooding and do not restrict or alter flow of flood waters.
- Policy 6.B.4 requires that development within areas subject to 100-year floods be designed and constructed in a manner that will not cause floodwaters to be diverted onto adjacent property or increase flood hazards to other areas.

12.3 Environmental Consequences and Mitigation Measures

12.3.1 Impact Assessment Methodology

This section describes the impact assessment methodology for hydrology – flood management resources in the Project area. Assessment included the application of quantitative modeling results and qualitative assessments. The assessment includes review of hydraulic modeling results performed using HEC-RAS and SRH-1D models. These models were used to forecast stages and channel and floodplain velocities for the Project alternatives. The evaluation of flood management impacts considers how proposed changes associated with Project alternatives would affect flooding in Reach 2B and the Restoration Area.

12.3.2 Significance Criteria

The thresholds of significance for impacts are based on the Environmental Checklist Form in Appendix G of the California Environmental Quality Act (CEQA) Guidelines, as amended. These thresholds also encompass the factors taken into account under the National Environmental Policy Act (NEPA) to determine the significance of an action in terms of its context and the intensity of its effects. Impacts to flood management resulting from the Project would be significant if they would cause any of the following:

- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure or a levee or dam, including:

  - Increase risk of levee failure due to underseepage, through-seepage, or associated landside slope stability mechanisms (this is described in Chapter 13.0, “Hydrology–Groundwater”).
  - Increase risk of levee failure due to erosion or associated landside slope stability mechanisms.
- Substantially reduce opportunities for levee and flood system facilities inspection and maintenance.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows.
- Place housing within a 100-year flood hazard area, as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.

Significance standards are relative to both existing conditions (2009) and future conditions (2035) unless stated otherwise.

12.3.3 Impacts and Mitigation Measures

This section provides a project-level evaluation of direct and indirect effects of the Project Alternatives on flood management. It includes analyses of potential effects relative to No-Action conditions in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. The analysis is organized by project alternative with specific impact topics numbered sequentially under each alternative. With respect to flood management, the environmental impact issues and concerns are:

1. Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding.
2. Substantially Reduce Opportunities for Levee and Flood System Facilities Inspection and Maintenance.
3. Substantially Alter Existing Drainage Patterns or Substantially Increase the Rate or Amount of Surface Runoff in a Manner Which Would Result in Flooding On- or Off-Site.
4. Placement of Structures Within a 100-Year Flood Hazard Area that Would Adversely Impede or Redirect Flood Flows.

Other flood-related issues covered in the Program Environmental Impact Statement/Report (PEIS/R) are not covered here because they are programmatic in nature and/or are not relevant to the Project area. The Project does not involve the construction or placement of any housing within a 100-year flood hazard zone. Therefore, this impact is not discussed further.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the San Joaquin River Restoration Program (SJRRP) would be implemented, including habitat restoration, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these activities would not achieve the Settlement goals. This section describes the impacts of the No-Action alternative. The analysis is a comparison to existing conditions, and no mitigation is required for No-Action.

Impact FLD-1 (No-Action Alternative*): Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding.* Under the No-Action Alternative, the Project would not be implemented, improvements in Reach 2B flood control structures or levees would not occur, and Project areas protected by local levees would remain within the FEMA-designated 100-year flood hazard area. Under existing conditions, the effective flood capacity of Reach 2B is less than the design capacity of 2,500 cfs, which implies that the channel capacity of Reach 2B has been reduced since construction of the existing levees. Reach 2B can functionally pass about 1,600 cfs of San Joaquin River flood flows with the boards out at Mendota Dam, and because of this, San Joaquin River flood flows that may otherwise have been routed through Reach 2B are instead routed through the Chowchilla Bypass. Therefore, the flood system is not operating as envisioned in the flood manual, potentially causing more flood damage to the system and adjacent landowners. This trend of decreasing channel capacity may continue under the No-Action Alternative. This impact is **potentially significant**. No mitigation is required for No-Action.

Impact FLD-2 (No-Action Alternative): *Substantially Reduce Opportunities for Levee and Flood System Facilities Inspection and Maintenance.* Under the No-Action Alternative, the Project would not be implemented and there would be no interruptions to flood system facility inspections and maintenance in Reach 2B. Restoration Flows could cause an increase in sediment deposition above the Chowchilla Bypass control structures requiring additional maintenance activities at this location. This is only one of several control structures maintained in the flood control system and increases in maintenance activities at this location are expected to be minor compared to maintenance requirements for the overall flood control system. This impact would be **less than significant**.

Impact FLD-3 (No-Action Alternative): *Substantially Alter Existing Drainage Patterns or Substantially Increase the Rate or Amount of Surface Runoff in a Manner Which Would Result in Flooding On- or Off-Site.* Under the No-Action Alternative, existing levees and floodplain width would be maintained. There would not be a change to existing drainage patterns that would affect the rate of surface water runoff or infiltration. There would be **no impact**.

Impact FLD-4 (No-Action Alternative): *Placement of Structures Within a 100-Year Flood Hazard Area that Would Adversely Impede or Redirect Flood Flows.* Under the No-Action Alternative, the Project would not be implemented and no additional Project structures would be placed within the 100-year flood hazard area. No actions would be

undertaken that would cause impacts under the No-Action Alternative. There would be **no impact.**

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would include construction of Project facilities, including a Compact Bypass channel, a new levee system encompassing the river channel with a narrow floodplain, and the South Canal. Other key features include construction of the Mendota Pool Dike (separating the San Joaquin River and Mendota Pool), a fish barrier below Mendota Dam, and the South Canal bifurcation structure with fish passage facility and fish screen, modification of the San Mateo Avenue crossing, and the removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Impact FLD-1 (Alternative A*): Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding.* The documented existing design capacity of Reach 2B is about 2,500 cfs. Compared to the No-Action Alternative, Alternative A would increase the capacity of Reach 2B to 4,500 cfs with 3 feet of freeboard. This increase in conveyance capacity in Reach 2B provides flood management agencies additional flexibility in how flood flows are managed in the lower San Joaquin River system.

The existing design capacity of Reach 3 is 4,500 cfs. Reach 3 can receive flood flow from the Kings River system through the James Bypass and Fresno Slough or can receive flood flow from the San Joaquin River system through Reach 2B. According to flood management guidelines, water from the Kings River system has priority to use available capacity in the San Joaquin River below Mendota Pool. If 4,500 cfs of flow is conveyed through Fresno Slough, there would be no flood flows conveyed through Reach 2B because there would be no additional capacity in Reach 3. If there is a reduced need for flood flow conveyance through Fresno Slough, Reach 2B is used to convey flood flows. If there is no need to convey flood flows from Fresno Slough, up to 4,500 cfs of flood flows could be conveyed through Reach 2B under Alternative A. This would reduce the amount of flow routed through Chowchilla Bypass, potentially reducing flood damage to the system and adjacent landowners in downstream areas.

Modifications to existing Federal flood control features or flood control operations in the Project area would require approval by the Corps and/or the CVFPB. Modifications to the Chowchilla Bifurcation Structure would not be allowed to affect flood control operations or the LSJLD's ability to route flood flows. However, the LSJLD may choose to use the additional capacity in Reach 2B to carry flood flows.

Flood management agencies have ultimate discretion in directing flood flows. If flood management guidelines are revised subsequent to implementation of the Project, there is a potential that flood flows through Reach 2B could have priority over flood flows from Fresno Slough. However, this is unlikely to occur because overall flood flow conveyance in the system would not be optimized. (If flood flow through Reach 2B was prioritized over Fresno Slough flows, Chowchilla Bypass would have 2,000 cfs of additional flood conveyance capacity.)

The increase in Reach 2B capacity would reduce the risk of flooding in Reach 2B, a beneficial effect for Reach 2B. The Project would build new levees to Corps standards, which would also be a beneficial effect associated with flood management. Under this alternative, the chance of a levee failure in Reach 2B during a large storm event would decrease. Although not observed during recent large flood events, a levee failure in Reach 2B would reduce potential levee failure in reaches downstream of Reach 2B. To the extent that this could occur, reducing the probability of Reach 2B levees failing in the future could increase the probability of downstream levee failure and flooding. However, the likelihood of this happening is low and downstream interests cannot claim flood protection benefits by relying on failure of upstream facilities, nor can they claim they are harmed if the upstream failure does not occur.

The mechanism for increased probability of levee failure would be from an increased frequency of large flows in downstream reaches. Without the Project, only flows up to 2,500 cfs from Reach 2A or flows up to 4,500 cfs from Fresno Slough could be directed through Reach 2B. However, under Alternative A, up to 4,500 cfs of flood or Restoration Flows could be routed from Reach 2A into Reach 3. Therefore, under Alternative A, flows greater than 2,500 cfs but within the Reach 3 capacity could occur more frequently. Potential levee damage from the increased frequency of larger flows would primarily be from erosion, and Program monitoring and maintenance efforts would repair erosion on a regular basis to lessen the likelihood of this leading to levee failures in the Program Restoration Area downstream of Reach 2B.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). To evaluate the potential for redirected flood risk, flows in Reach 3 with and without the restoration project (inclusive of both Program and Project elements) were estimated for the period from October 1921 through September 30, 2003, using data from the San Joaquin River Restoration Daily Flow Model developed in RiverWare (Reclamation 2012). These data were used to calculate the daily average flow duration and annual maximum flows from Reach 2B to Reach 3. The flow duration curve is a flow exceedance probability curve (Figure 12-3), which shows the percentage of time that the stream flow is likely to equal or exceed a flow value of interest. For example, in Figure 12-3, a flow of 100 cfs from Reach 2B to Reach 3 is exceeded 80 percent of the time under existing conditions and 98 percent of the time under Restoration Flow conditions. In other words, under Restoration Flows, flow from Reach 2B to Reach 3 will be equal to or greater than 100 cfs, 98 percent of the time. A flow of 4,500 cfs (the current capacity of Reach 3) is exceeded less than 0.5 percent of the time under existing conditions. This would increase to about 2.5 percent of the time under Restoration Flows.

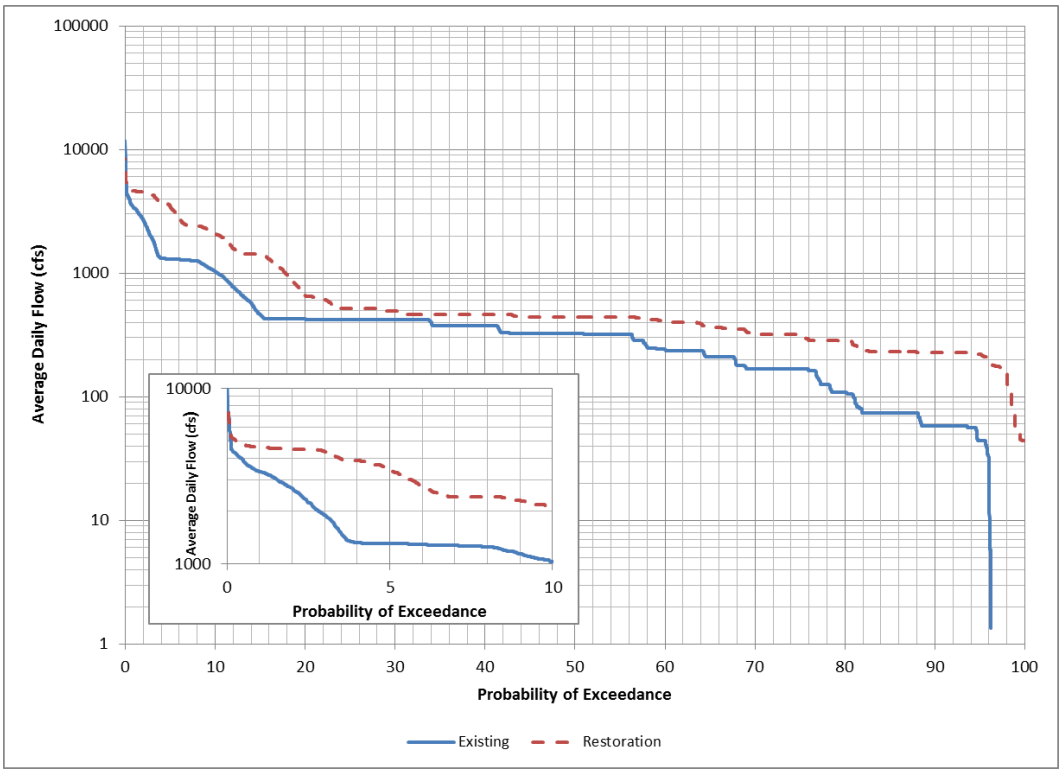


Figure 12-3.
Flow Duration Curve for Flows from Reach 2B

Annual maximum flow is the maximum flow that occurs within any year. It is the flow typically used for the design of levees and other flood control facilities. Though the maximum instantaneous flow rather than the daily average flow is usually used for design on large rivers, such as the San Joaquin River, the two are typically similar. Figure 12-4 shows the flood frequency curve for Reach 3 with and without Restoration Flows. With Restoration Flows, the size of smaller events (less than a 2 percent annual exceedance probability or 50-year event) would increase but for larger, less frequent, flood events the flow would decrease. For example, the 5-year event (20 percent annual exceedance probability) would increase from a little over 2,000 cfs to over 4,000 cfs with Restoration Flows, but the 1 percent annual exceedance flow (100-year event) would decrease from 9,000 cfs to 7,000 cfs.

Overall, increasing the design capacity of Reach 2B to convey Restoration Flows would have a neutral effect. Because the increase in the frequency of smaller, low-risk events would be offset, or partially offset, by a decrease in larger, high-risk events and because Program monitoring and maintenance efforts would repair levee erosion from Restoration Flows, impacts of Alternative A would be **less than significant**.

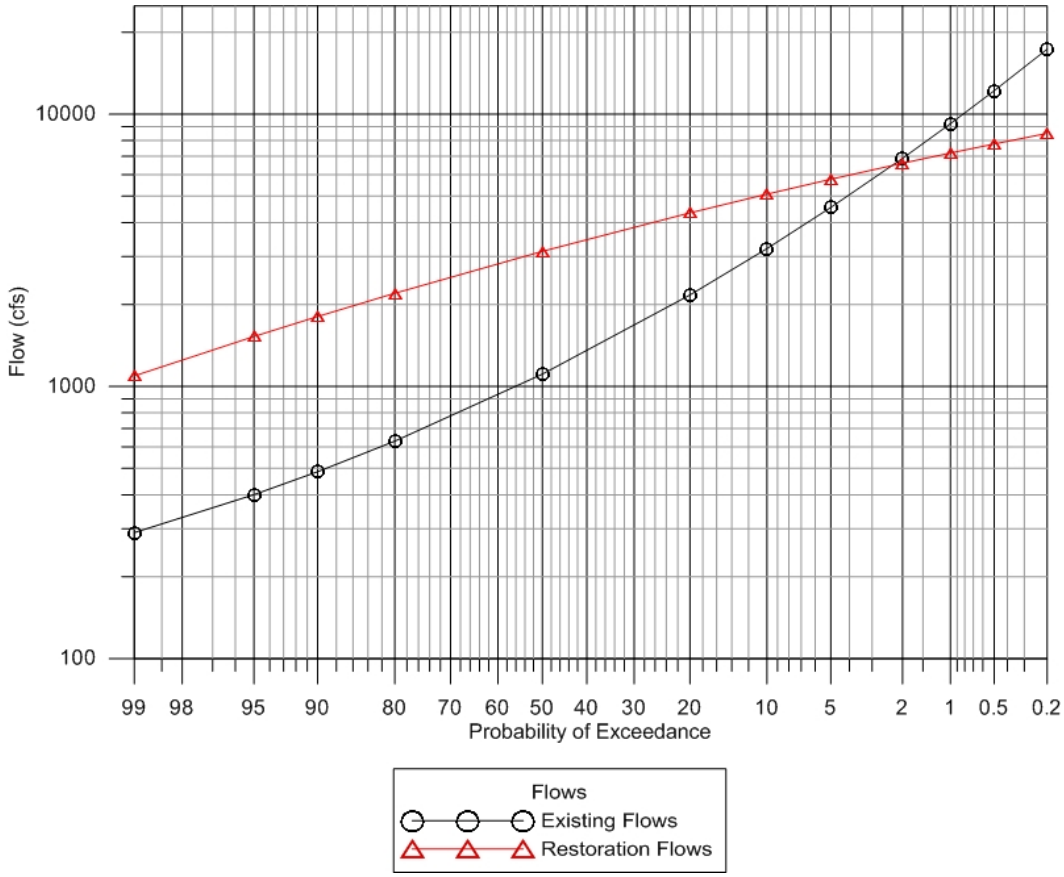


Figure 12-4.
Flood Frequency Curve for Flows from Reach 2B

Impact FLD-2 (Alternative A): *Substantially Reduce Opportunities for Levee and Flood System Facilities Inspection and Maintenance.* LSJLD is responsible for operation and maintenance and emergency management of State flood control facilities within the Project vicinity including maintenance of levees, channel bottoms, and flood management facilities. Operations and maintenance activities include vegetation management activities, sediment management and removal activities, cleaning of screens and trash racks on facilities, opening and closing gates and flap gates in the bypass systems, and flood watch. Important facilities maintained by the district include the Chowchilla Bypass, the Eastside Bypass, and the Mariposa Bypass. The LSJLD is not responsible for operation and maintenance of privately owned levees.

Compared to the No-Action Alternative, construction activities may temporarily limit access to levees and facilities for maintenance and inspection staff. However, construction activities would not completely impede inspection and maintenance activities; minor coordination of such activities would be required. New levees that are constructed would be accessible. Therefore, potential short-term effects would be negligible.

The Project includes long-term operations, maintenance, and monitoring of the proposed facilities and features (see Section 2.2.4). Levees would require access for vegetation management, levee inspections, and levee restoration. Control structures would require access for annual operating maintenance for control gates, lubricating the fittings, greasing and inspecting the motors, replacing parts and equipment, in-channel sediment removal in the structure vicinity, and cleaning the trash rack. Fish passage facilities, fish screens, and fish barriers would also need to be inspected, operated, and maintained. Monitoring activities would require access for physical and nonphysical activities within the Project area, including flow monitoring, groundwater level monitoring, aerial and topographic surveys, vegetation surveys, sediment mobilization monitoring, and monitoring of passage and screening effectiveness. Implementation of these operation, maintenance, and monitoring activities is part of the Project and access would be provided to maintenance and inspection staff. Therefore, long-term access and opportunities for levee and flood system facilities inspection and maintenance would be provided.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). This impact would be **less than significant**.

Impact FLD-3 (Alternative A): *Substantially Alter Existing Drainage Patterns or Substantially Increase the Rate or Amount of Surface Runoff in a Manner Which Would Result in Flooding On- or Off-Site.* Under Alternative A, setback levees would be constructed to widen the floodplain. The floodplain would also be graded in locations to set it at the elevation desired for restoration. Compared to the No-Action Alternative, these activities would alter local drainage patterns and possibly affect existing drainage outside the mainstem of the river by blocking channels or by redirecting overland flow that otherwise would have drained into the Project footprint. This would potentially cause ponding on the landward side of levees. However, the construction of new levees would include seepage control measures, inspection trenches, maintenance roads, and drainage trenches to direct off-site drainage, as well as the realignment or modification of existing drainage channels (see Section 2.2.4). Surface drainage ditches would only be intended to capture and direct runoff; they are not intended to address groundwater seepage or through-levee seepage. These actions would reduce potential effects to negligible levels.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). This impact would be **less than significant.**

Impact FLD-4 (Alternative A): *Placement of Structures Within a 100-Year Flood Hazard Area that Would Adversely Impede or Redirect Flood Flows.* The major facilities that would be constructed within the 100-year flood hazard area under Alternative A include the Compact Bypass channel, Mendota Pool Dike, modifications to the San Mateo Avenue crossing, a diversion structure for the South Canal, modifications to the Chowchilla Bifurcation Structure, and fish passage facilities.

Compared to the No-Action Alternative diversion structures and fish passage facilities could create localized backwater and redirection effects. These effects would be considered during Project design. Structures would be designed in general accordance with Reclamation Design Standards No. 3 for water conveyance facilities, fish facilities, and roads and bridges, applicable design codes, and commonly accepted industry standards. Levee design would be based on the Corps *Engineer Manual 1110-2-1913 Design and Construction of Levees* guidelines (Corps 2000a) and *Engineer Manual 1110-2-301 Guidelines for Landscape Planting and Vegetation Management at Floodwalls, Levees, & Embankment Dams* (Corps 2000b).

Localized backwater and redirection effects at Project structures would be considered during design of levee heights. Levees would be designed to maintain 3 feet of freeboard on the levees at 4,500 cfs (see Section 2.2.4). Therefore, flooding effects would be negligible.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). This impact would be **less than significant.**

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B would include construction of Project features including a Compact Bypass channel, a new levee system with a wide, consensus-based floodplain encompassing the river channel, and the Compact Bypass Bifurcation Structure with fish passage facility and fish screen. Other key features include construction of a fish passage facility at the San Joaquin River control structure at the Chowchilla Bifurcation Structure, the re-route of Drive 10 ½ (across the Compact Bypass control structure), and removal of the San Mateo Avenue crossing. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Impact FLD-1 (Alternative B*): Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding.* Refer to Impact FLD-1 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A with the following exception. The Compact Bypass design in Alternative B includes fewer grade control structures than the other alternatives, which would initiate channel bed erosion in Reach 2B to remove sediment that has been deposited in the San Joaquin River arm of Mendota Pool. The channel bed erosion in Reach 2B would result in sediment deposition in the Reach 3 channel for approximately 1 mile downstream of the Compact Bypass (RM 203). The maximum estimated water surface increase resulting from this sedimentation is approximately 0.25 feet. Levee improvements would be extended in the upper portion of Reach 3 to approximately RM 203 to offset this water surface increase if needed to maintain 3 feet of freeboard. This impact would be **less than significant**.

Impact FLD-2 (Alternative B): *Substantially Reduce Opportunities for Levee and Flood System Facilities Inspection and Maintenance.* Refer to Impact FLD-2

(Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. This impact would be **less than significant.**

Impact FLD-3 (Alternative B): ***Substantially Alter Existing Drainage Patterns or Substantially Increase the Rate or Amount of Surface Runoff in a Manner Which Would Result in Flooding On- or Off-Site.*** Refer to Impact FLD-3 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. This impact would be **less than significant.**

Impact FLD-4 (Alternative B): ***Placement of Structures Within a 100-Year Flood Hazard Area that Would Adversely Impede or Redirect Flood Flows.*** Refer to Impact FLD-4 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A, with the following exceptions. The major facilities that would be constructed within the 100-year flood hazard area include the Compact Bypass channel, Compact Bypass Bifurcation Structure, and fish passage facilities, and the San Mateo Avenue crossing would be removed. Localized backwater and redirection effects at Project structures would be considered during design of levee heights. Therefore, flooding effects would be negligible. This impact would be **less than significant.**

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C would include construction of Project features including Fresno Slough Dam, a new levee system with a narrow floodplain encompassing the river channel, and the Short Canal. Other key features include construction of the Mendota Dam fish passage facility, fish barrier below Fresno Slough Dam, the Short Canal control structure and fish screen, the Chowchilla Bifurcation Structure fish passage facility, modification of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Impact FLD-1 (Alternative C*): Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding.*** Refer to Impact FLD-1 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A. This impact would be **less than significant**.

Impact FLD-2 (Alternative C): ***Substantially Reduce Opportunities for Levee and Flood System Facilities Inspection and Maintenance.*** Refer to Impact FLD-2 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A. This impact would be **less than significant.**

Impact FLD-3 (Alternative C): ***Substantially Alter Existing Drainage Patterns or Substantially Increase the Rate or Amount of Surface Runoff in a Manner Which Would Result in Flooding On- or Off-Site.*** Refer to Impact FLD-3 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A. This impact would be **less than significant.**

Impact FLD-4 (Alternative C): ***Placement of Structures Within a 100-Year Flood Hazard Area that Would Adversely Impede or Redirect Flood Flows.*** Refer to Impact

FLD-4 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A, with the following exceptions. The major facilities that would be constructed within the 100-year flood hazard area include Fresno Slough Dam, Short Canal control structure, fish passage facilities, modification of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. The new dam on Fresno Slough would back up Fresno Slough to a similar level as it is presently backed up by Mendota Dam. The Fresno Slough Dam would have a reinforced concrete spillway. The spillway structure would be comprised of multiple gates, which serve to control the flow of water from the Mendota Pool to the San Joaquin River (see Section 2.2.7). Therefore, flooding effects would be negligible**.** This impact would be **less than significant.**

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D would include construction of Project features including Fresno Slough Dam, a new levee system with a wide floodplain encompassing the river channel, and the North Canal. Other key features include construction of the Mendota Dam fish passage facility, a fish barrier below Fresno Slough Dam, the North Canal bifurcation structure with fish passage facility and fish screen, removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure, removal of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Impact FLD-1 (Alternative D*): Expose People or Structures to a Significant Risk of Loss, Injury, or Death Involving Flooding.* Refer to Impact FLD-1 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A. This impact would be **less than significant.**

Impact FLD-2 (Alternative D): *Substantially Reduce Opportunities for Levee and Flood System Facilities Inspection and Maintenance.* Refer to Impact FLD-2 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A. This impact would be **less than significant.**

Impact FLD-3 (Alternative D): *Substantially Alter Existing Drainage Patterns or Substantially Increase the Rate or Amount of Surface Runoff in a Manner Which Would Result in Flooding On- or Off-Site.* Refer to Impact FLD-3 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A. This impact would be **less than significant.**

Impact FLD-4 (Alternative D): *Placement of Structures Within a 100-Year Flood Hazard Area that Would Adversely Impede or Redirect Flood Flows.* Refer to Impact FLD-4 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A, with the following exceptions. The major facilities that would be constructed within the 100-year flood hazard area include Fresno Slough Dam, the North Canal bifurcation structure, and fish passage facilities. The riverside control structure of the Chowchilla Bifurcation Structure and the San Mateo Avenue crossing would be removed. Portions of the Main Canal and Helm Ditch would be relocated. The new dam on Fresno Slough would back up Fresno Slough to a similar level as it is presently backed up by Mendota Dam. The Fresno Slough Dam would have a reinforced

concrete spillway. The spillway structure would be comprised of multiple gates, which serve to control the flow of water from the Mendota Pool to the San Joaquin River (see Section 2.2.8). Therefore, flooding effects would be negligible**.** This impact would be **less than significant.**

13.0 Hydrology – Groundwater

This section describes the environmental and regulatory settings of groundwater, including the environmental consequences and mitigation, as they pertain to implementation of Project alternatives. Groundwater resources describe the water resources related to water flowing in the subsurface through porous sediments.

13.1 Environmental Setting

The Project area is in Fresno and Madera counties, near the town of Mendota, California, as shown on Figure 1-2 of Chapter 1.0, "Introduction." This area is located above the San Joaquin Valley Groundwater Basin.

13.1.1 Regional Setting

The San Joaquin Valley Groundwater Basin makes up the southern two-thirds of the 400-mile-long, northwest trending asymmetric trough of the Central Valley regional aquifer system in the southern extent of the Great Valley Geomorphic Province. As defined in Bulletin 118, California's Groundwater (California Department of Water Resources [DWR] 2003), the San Joaquin Valley Groundwater Basin is comprised of two hydrologic regions, which are divided by the San Joaquin River near Reach 2B: the San Joaquin River hydrologic region to the north and the Tulare Lake hydrologic region to the south; therefore, the Project area lies within both hydrologic regions.

Groundwater Resources of San Joaquin River Hydrologic Region

The San Joaquin River hydrologic region is heavily groundwater-reliant, with groundwater making up approximately 36 percent of the annual supply for agricultural and urban uses (DWR 2014a). The San Joaquin River hydrologic region consists of surface water basins draining into the San Joaquin River system, from the Cosumnes River basin on the north through the southern boundary of the San Joaquin River watershed. Aquifers in the San Joaquin Valley Groundwater Basin are thick and typically extend to depths of up to 800 feet.

Groundwater in the San Joaquin River hydrologic region historically flowed from the valley flanks to the axis of the valley during predevelopment conditions, then north toward the Delta. In the 1920s, development of a deep-well turbine pump and increased availability of electricity led to expansion of agriculture, and ultimately declining groundwater levels between 1920 and 1950 (DWR 2003). Groundwater pumping and recharge from imported irrigation water have resulted in a change in regional flow patterns. As described in the Program Environmental Impact Statement/Report (PEIS/R) (San Joaquin River Restoration Program [SJRRP] 2011, page 12-4), flow largely occurs from areas of recharge towards areas of lower groundwater levels. Vertical movement of water in the aquifer has been altered in this region as a result of thousands of wells constructed with perforations above and below the confining unit (Corcoran Clay

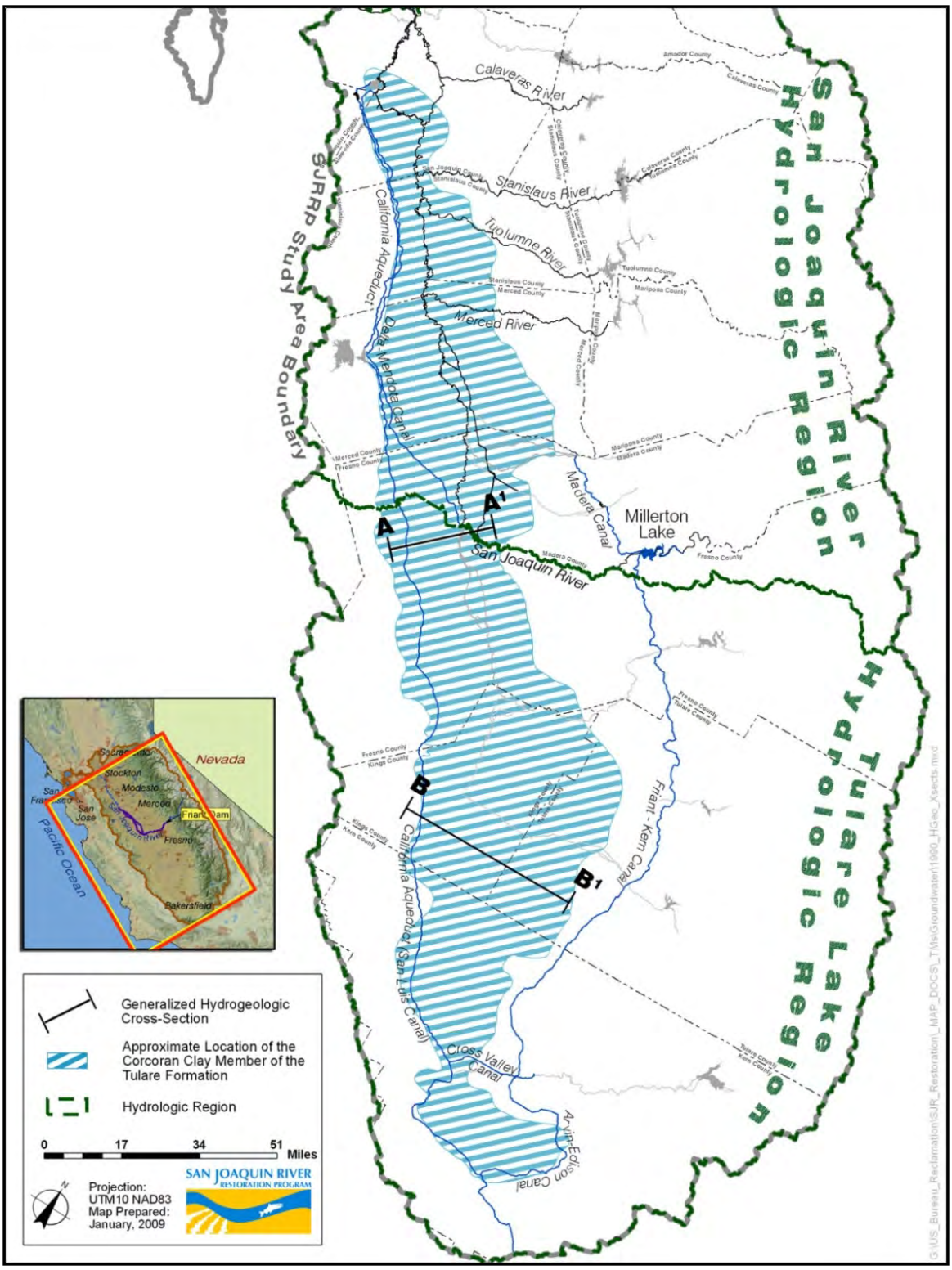
Member), where present, providing a direct hydraulic connection. This increase in vertical flow may have been partially offset by a decrease in vertical flow resulting from the inelastic compaction of fine-grained materials in the aquifer system, which occurs largely due to deep groundwater pumping. The approximate extent of the Corcoran Clay is illustrated on Figure 13-1.

The aquifer system of the San Joaquin Valley Groundwater Basin is divided into two major aquifers: an unconfined to semiconfined aquifer above the Corcoran Clay, a thick zone of clay deposited as part of the sequence of lacustrine and marsh deposits underlying Tulare Lake, and a confined aquifer beneath the Corcoran Clay. The unconfined to semiconfined aquifer can be divided into three hydrogeologic units based on the source of the sediment: Coast Range alluvium, Sierra Nevada sediments, and flood-basin deposits (see Figures 13-1 and 13-2).

The Coast Range alluvial deposits are derived largely from the erosion of marine rocks from the Coast Range. These deposits are up to 850 feet thick along the western edge of the valley and taper off to the east as they approach the center of the valley floor. The alluvial deposits contain a large proportion of silt and clay, are high in salts, and also contain elevated concentrations of selenium and other trace elements. The Sierra Nevada sediments on the eastern side of the region are derived primarily from granitic rock and consist of predominantly well-sorted micaceous sand. These deposits make up most of the total thickness of sediments along the valley axis and gradually thin to the west until pinching out near the western boundary. The Sierra Nevada sediments are relatively permeable with hydraulic conductivities three times the conductivities of the Coast Range deposits. Flood-basin deposits are relatively thin and were derived in recent time from sediments of the Coast Ranges to the west and from sediments of the Sierra Nevada to the east. These deposits occur along the center of the valley floor and consist primarily of moderately to densely compacted clays ranging between 5 and 35 feet thick.

On a regional scale, the Corcoran Clay divides the groundwater system, ranges from zero to 160 feet thick, and is found between 80 and 400 feet below the land surface. The confined aquifer is overlain by the Corcoran Clay Member of the Tulare Formation and consists of mixed origin sediments.

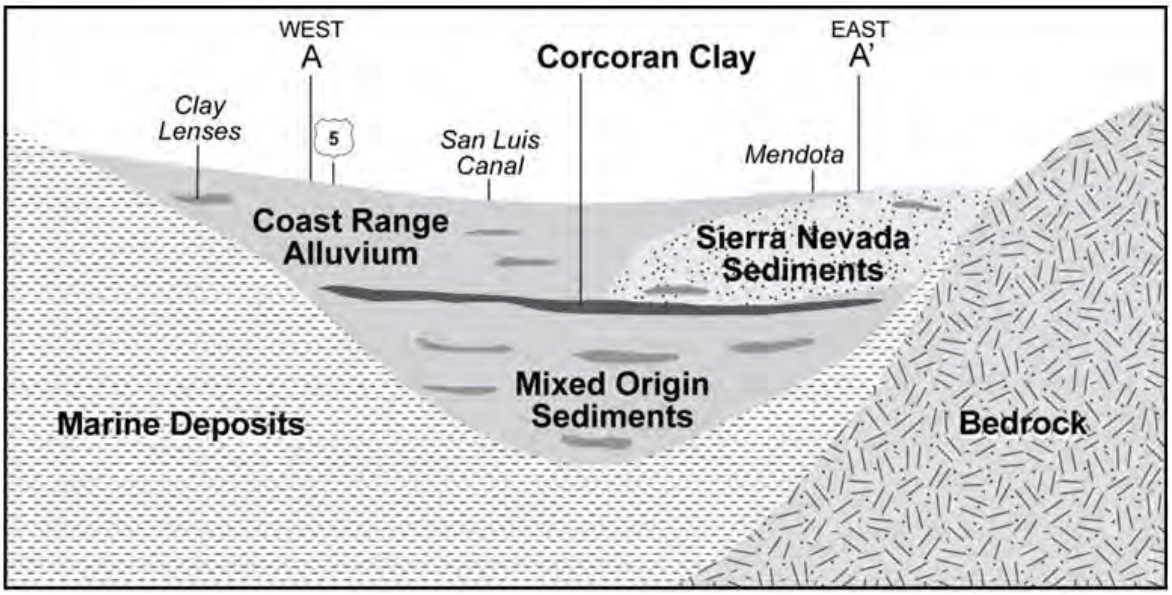
The semiconfined aquifer system of the San Joaquin Valley has historically been recharged by mountain rain and snowmelt along the valley margins. Recharge has generally occurred by stream seepage, deep percolation of rainfall, and subsurface inflow along basin boundaries. As agricultural practices expanded in the region, recharge was augmented with deep percolation of applied agricultural water and seepage from the distribution systems used to convey this water. Recharge of the lower confined aquifer consists of subsurface inflow from the valley floor and foothill areas to the east of the eastern boundary of the Corcoran Clay Member. Present information indicates that the clay layers, including the Corcoran Clay, are not continuous in some areas, and some seepage from the semiconfined aquifer above does occur through the confining layer.



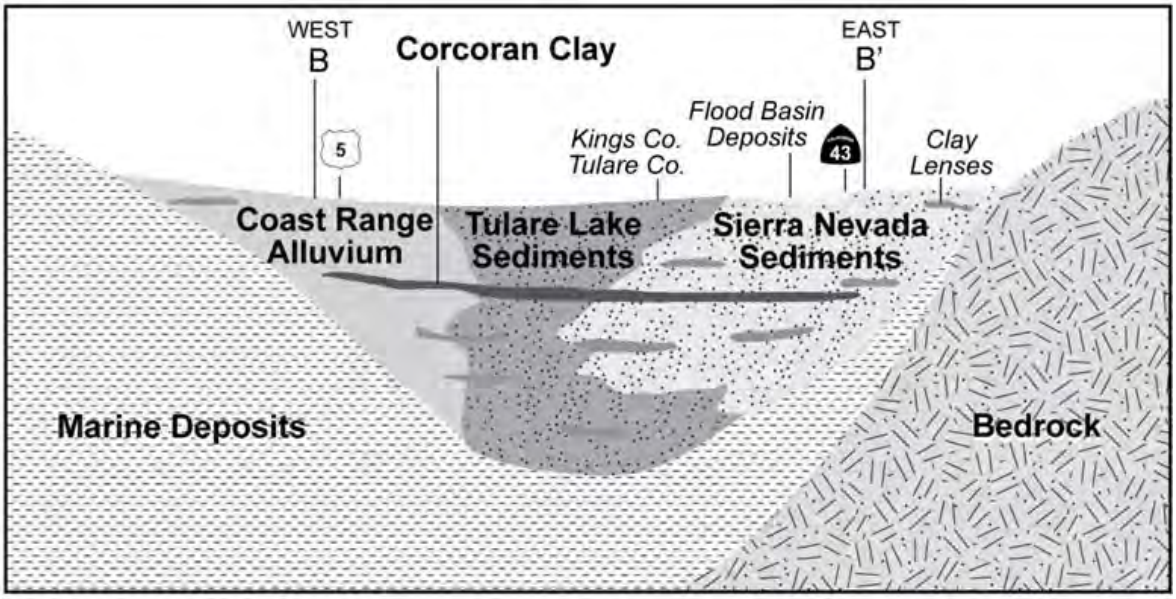
Source: SJRRP 2011

Figure 13-1.
Approximate Boundary of Corcoran Clay and Transect Lines for Hydrogeologic Cross Sections

San Joaquin River Hydrologic Region



Tulare Lake Hydrologic Region



Source: SJRRP 2011

Figure 13-2.
Generalized Hydrogeologic Cross Sections in San Joaquin River and Tulare Lake Hydrologic Regions

The decline in groundwater levels between 1920 and 1950 was as much as 40 to 80 feet in the east side and up to 30 feet in the west side of the San Joaquin River hydrologic region. In 1967, the California Aqueduct replaced groundwater as the primary source of irrigation supply to the area south of Mendota, and consequently, this area became less reliant on groundwater (DWR 2003). However, as illustrated on Figure 13-3,

groundwater pumping continued to increase through time as the acreage of irrigated agriculture continued to increase.

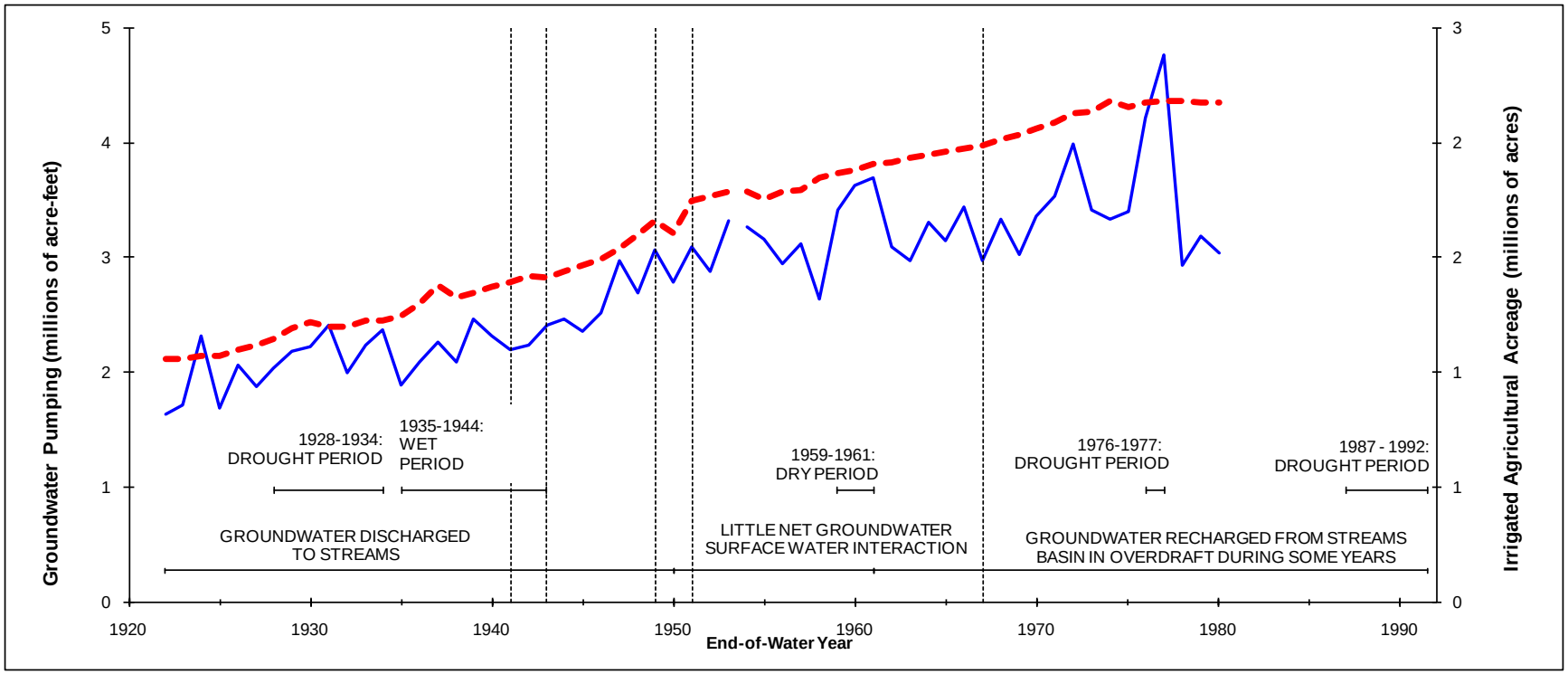
Land subsidence is the lowering of the land-surface elevation due to changes in the subsurface. Four types of land subsidence that occur in the San Joaquin Valley include: aquifer-system compaction due to groundwater level decline, near-surface hydrocompaction, subsidence due to fluid withdrawal from oil and gas fields, and subsidence caused by deep-seated tectonic movements (Sneed et al. 2013). Groundwater level decline along with surface hydrocompaction are the primary causes of land subsidence in the San Joaquin Valley. Maximum land subsidence rates occurred in the 1960s with historic lows in the San Joaquin Valley Groundwater Basin exceeding 30 feet. The southern and western areas of the valley were most affected. Figure 13-4 illustrates land subsidence contours in the San Joaquin River and Tulare Lake hydrologic regions from 1926 to 1970.

Surface water deliveries from the State Water Project and other regional conveyance facilities in the 1970s and 1980s significantly reduced the demand for groundwater for agricultural water use. Although reduced groundwater pumping and imported surface water largely diminished the subsidence problem, subsidence continued in some areas but at a slower rate, due to the time lag involved in the redistribution of pressures in the confined aquifers (DWR 2014a).

Groundwater quality in the San Joaquin Valley Groundwater Basin is variable, but is suitable for most urban and agricultural uses with the exception of some localized areas in the San Joaquin River hydrologic region. The primary constituents of concern include salinity, nitrate, arsenic, total dissolved solids (TDS), boron, chloride, selenium, dibromochloro-propane, and radon. Additional details on groundwater quality are provided in the PEIS/R (SJRRP 2011, page 12-25 to 12-29).

Inadequate drainage and accumulating salts have been persistent problems for irrigated agriculture along the west side and in parts of the east side of the San Joaquin River Hydrologic Region for more than a century. The most extensive drainage problems exist on the west side of the San Joaquin River and Tulare Lake hydrologic regions. The drainage problem developed as a result of imported water from man-made infrastructure, naturally occurring saline soils, and distinctive geology that prevents natural drainage.

Soils on the west side of the San Joaquin River Hydrologic Region are derived from marine sediments are high in salts and trace elements. Irrigation of these soils has mobilized salts and trace elements and facilitated their movement into the shallow groundwater. Much of the irrigation has been with imported water, which has resulted in inadequate drainage, rising groundwater, and increasing soil salinity.



Source: SJRRP 2011

Note:

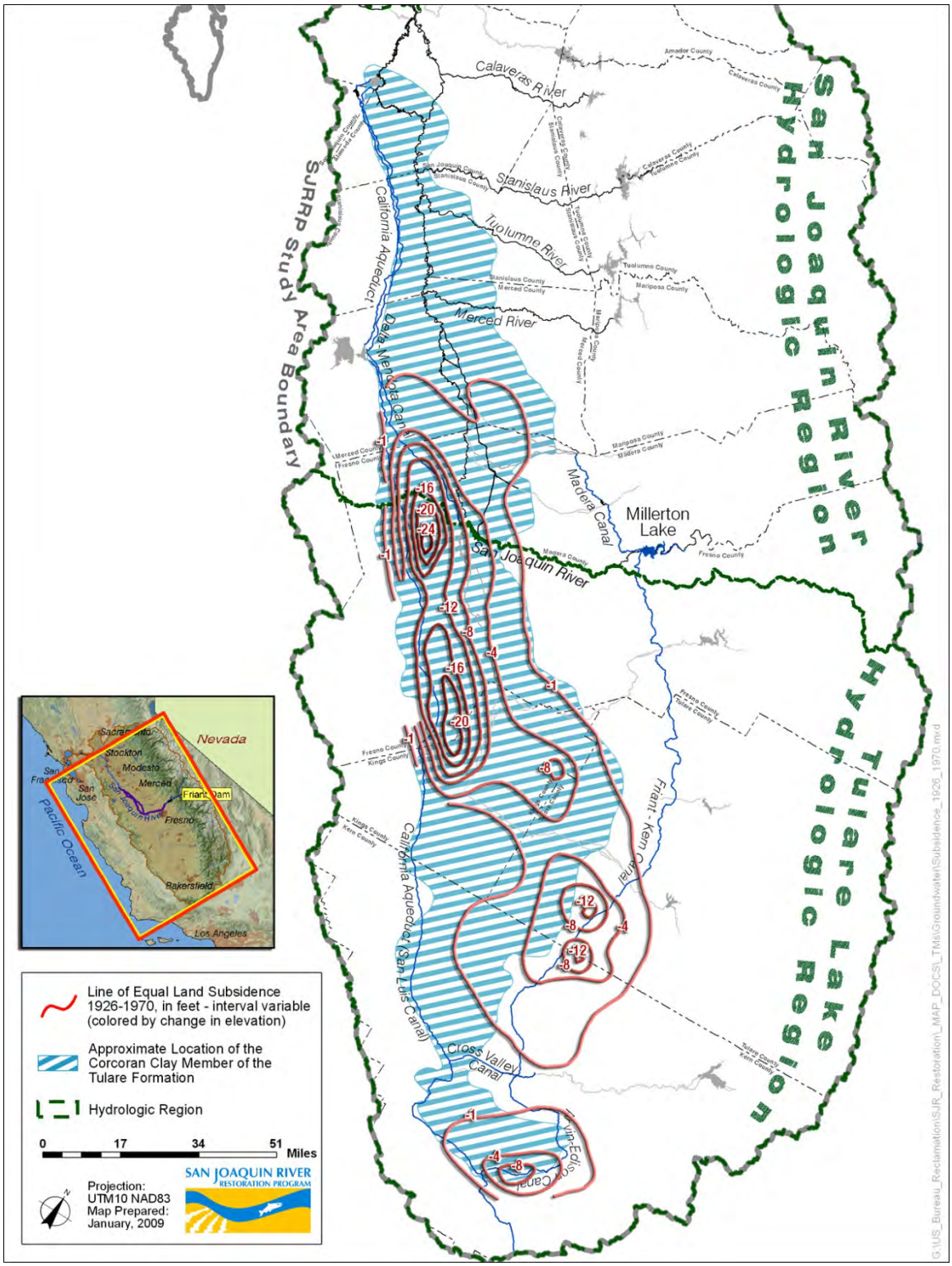
Data available for 1922 through 1980. Data developed as part of the Central Valley Ground-Surface Water Model.

Legend:

Irrigated agricultural acreage

Groundwater Pumping

Figure 13-3.
Historical Groundwater Pumping and Irrigated Agricultural Acreage for San Joaquin River Hydrologic Region



Source: SJRRP 2011

Figure 13-4.
Land Subsidence in the San Joaquin River and Tulare Lake Hydrologic Regions

In some portions of this hydrologic region, natural drainage conditions are poor, and imported irrigation water makes the upper, semiconfined aquifer (shallow groundwater table) even shallower. Therefore, groundwater levels often encroach on the root zone of agricultural crops, and subsurface drainage is often improved with constructed facilities (e.g., interceptor drains) in order to sustain irrigation.

Present problem areas were defined in the San Joaquin Valley Drainage Program (SJVDP) (DWR 2005) as locations where the water table is within 5 feet of the ground surface at any time during the year. Potential problem areas were defined in the SJVDP at locations where the water table is between 5 and 20 feet below the ground surface (DWR 2005). (The term "shallow groundwater" is referred to here as the highest zone of saturation down to a depth of approximately 20 feet below ground surface.)

Seepage and waterlogging of crops along the lower reaches of the San Joaquin River have historically been an issue. High periodic streamflows and local flooding combined with shallow groundwater near the San Joaquin River, and in the vicinity of its confluence with major tributaries, have resulted in seepage-induced waterlogging damage to low lying farmland. During flood-flow events, lateral seepage and structural stability issues with existing levees have been identified. Seepage problems were reported along the Chowchilla Bypass below the bifurcation structure on both sides of the channel in 2006.

Groundwater Resources of Tulare Lake Hydrologic Region

The Tulare Lake hydrologic region is a closed drainage basin at the south end of the San Joaquin Valley, south of the San Joaquin River watershed, encompassing surface water basins draining to the Kern Lake bed, Tulare Lake bed, and Buena Vista Lake bed. The primary aquifer in the San Joaquin Valley Groundwater Basin extends to as deep as 1,000 feet below ground surface in the southern portion of the basin (DWR 2003).

The semiconfined aquifer in the Tulare Lake hydrologic region contains the same hydrogeologic units as the San Joaquin River hydrologic region (Coast Range alluvium, Sierra Nevada sediments, and flood-basin deposits), but the region also contains Tulare Lake sediments in the axis of the valley (see Figure 13-2). The Corcoran Clay occurs at depths between 300 and 900 feet below ground surface in the Tulare Lake hydrologic region. The confined aquifer is overlain by the Corcoran Clay, but consists of the same hydrogeologic units as the unconfined to semiconfined aquifer. The Tulare Lake hydrologic region has semiconfined aquifer conditions to the west above the Corcoran Clay layer, and on the east side of the region where the clay is not present. Tulare Lake sediments present in the axis of the San Joaquin Valley have similar characteristics to flood-basin deposits present in the San Joaquin River hydrologic region (see Figure 13-2).

The semiconfined aquifer in the Tulare Lake hydrologic region is recharged by seepage from streams, canals, infiltration of applied water, and subsurface inflow. Precipitation is a source of recharge to the semiconfined aquifer only in wet years. Seepage from streams and canals is highly variable and depends on annual hydrologic conditions. Some of the water recharged to the semiconfined aquifer seeps through the confining clay layers,

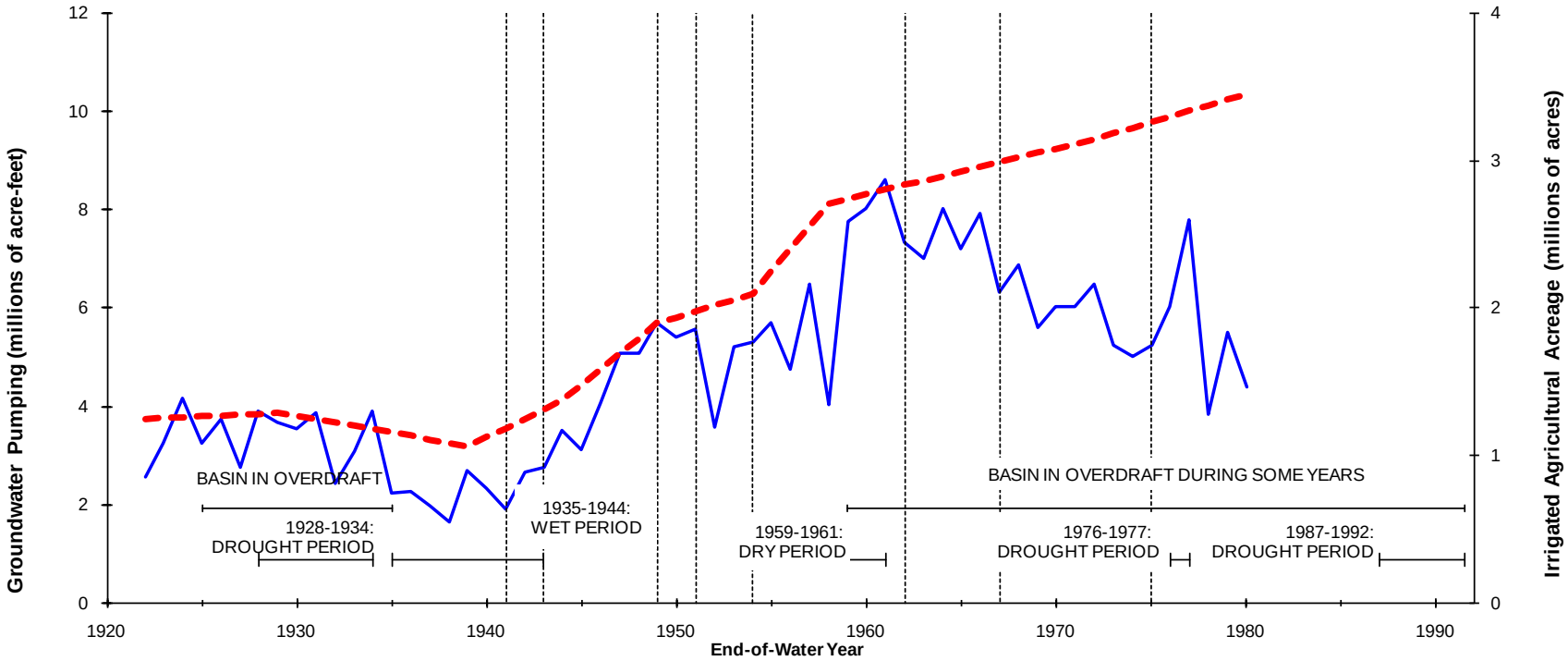
including the Corcoran Clay, which are discontinuous in some areas. Lateral flow from the semiconfined aquifer also recharges the lower confined aquifer.

The Tulare Lake hydrologic region has historically been heavily reliant on groundwater supplies. Agricultural development in the Tulare Lake hydrologic region began in the 1800s, and groundwater has been the primary source of irrigation water. Figure 13-5 illustrates changes in groundwater pumping and irrigated acreage for the Tulare Lake hydrologic region from 1922 to 1980. As described in the PEIS/R (SJRRP 2011, page 12-41), groundwater use in this hydrologic region has historically accounted for 33 percent of the total annual water supply and for 35 percent of all groundwater use in the State. Groundwater use in the hydrologic region represents approximately 10 percent of the State's total agricultural and urban water use.

Similar to the San Joaquin River hydrologic region, the Tulare Lake hydrologic region has been impacted by historical groundwater level decline and resulting land subsidence. Groundwater level decline in central Fresno County between the 1940s and 1980s has been substantial; decreasing approximately 50 to 100 feet (Williamson et al. 1989). Groundwater levels in the lower confined aquifer in the west side of the Tulare Lake hydrologic region declined as much as 400 feet from predevelopment to the 1960s (Williamson et al. 1989). Land subsidence, resulting from groundwater level decline and to a lesser extent from oil and gas withdrawal and near-surface hydrocompaction, is illustrated on Figure 13-4.

As with the San Joaquin River hydrologic region, groundwater quality in the Tulare Lake hydrologic region is variable, but in general, is suitable for most urban and agricultural uses (DWR 2003). The primary constituents of concern are salinity, nitrate, dibromochloropropane, arsenic, TDS, boron, selenium, and radon. Groundwater use for agricultural water supply is limited because of the high TDS concentrations above the Corcoran Clay in the western portion of Fresno and King Counties. Salinity and trace elements in some soil and shallow groundwater on the western side of the Tulare Lake Hydrologic Region are also of concern.

Subsurface drainage problems associated with the west side of the San Joaquin Valley Groundwater Basin extend from north to south in the Tulare Lake Hydrologic Region. The northern boundary of the Tulare Lake Hydrologic Region with the San Joaquin River Hydrologic Region is partially bounded by Reaches 1 and 2 of the San Joaquin River. Seepage problems identified in Reaches 1 and 2 influence local groundwater conditions in the Kings Subbasin in the Tulare Lake Hydrologic Region. (See the "Groundwater Resources of San Joaquin River Hydrologic Region" section above for additional discussion on seepage and waterlogging along the San Joaquin River.)



Source: SJRRP 2011

Note:

Data available from 1922 to 1980. Data developed as part of the Central Valley Ground-Surface Water Model (Reclamation et al, 1990 as cited in SJRRP 2011a)

Legend:

Groundwater Pumping

Irrigated agricultural acreage

Figure 13-5.
Historical Groundwater Pumping and Irrigated Agricultural Acreage for Tulare Lake Hydrologic Region

Conjunctive Use Programs

Conjunctive management or conjunctive use refers to the coordinated and planned use and management of both surface water and groundwater resources to maximize the availability and reliability of water supplies in a region to meet various management objectives. Water is stored in the groundwater basin that is planned to be used later by intentionally recharging the basin when excess water supply is available, for example, during years of above-average surface water supply or through the use of recycled water (DWR 2014b).

Various forms of conjunctive use are practiced throughout California. The form of conjunctive use ranges from incidental conjunctive use benefits to rigorous management programs implemented through detailed operating guidelines. For this discussion, conjunctive use is characterized as incidental conjunctive use, artificial recharge, or active substitution. These three types of conjunctive use can occur individually or may be used in conjunction with one another. Major conjunctive use programs currently in place are highlighted in DWR's *California Water Plan Update* (DWR 2014b) and some of these programs are discussed below; however, this is not a complete summary of all conjunctive use programs currently in operation or planned.

Incidental Conjunctive Use

Incidental conjunctive use occurs when an area relies on surface water when it is available and on groundwater when surface water is not available. Development of surface water storage and delivery projects by U.S. Department of the Interior, Bureau of Reclamation (Reclamation), DWR, and others has been an important factor in allowing water users to reduce groundwater pumping and build up groundwater storage for future use. Management techniques may be used to define the timing and location of surface water deliveries and groundwater pumping to maximize water supply reliability. However, groundwater pumping may increase in years of below-average precipitation and reduced availability of imported surface water supplies.

Artificial Recharge

Conjunctive use programs incorporating artificial recharge methods require a source of surface water (imported or reclaimed) that is not needed for immediate use. The surface water is placed directly into the ground by various means, including spreading ponds and injection. This water is then available for use in dry periods. This is a common practice in many areas of the State, especially in the San Joaquin River and Tulare Lake hydrologic regions.

Active Conjunctive Use Programs

Active conjunctive use programs in the San Joaquin Valley Groundwater Basin, as described in the PEIS/R (SJRRP 2011, page 12-52 to 12-57), include those listed below, the last of which is active in the Project area.

- Semitropic Water Storage District Groundwater Banking Program.
- Kern Water Bank Authority, Kern Water Bank.
- City of Fresno, Leaky Acres Water Recharge Facility.

- Farmington Groundwater Recharge Program.
- Madera Irrigation District Water Supply Enhancement Project.
- Mendota Pool, Ten-Year Exchange Agreements, Proposed Annual Water Exchange, California.

Additional Proposed Groundwater Banking Projects

Additional direct and in-lieu recharge groundwater banks have been proposed in the San Joaquin Valley by Friant Division long-term contractors and non-Friant Division contractors. These proposed projects are listed in the PEIS/R (SJRRP 2011, page 12-56 to 12-57).

13.1.2 Project Setting

Delta-Mendota Subbasin

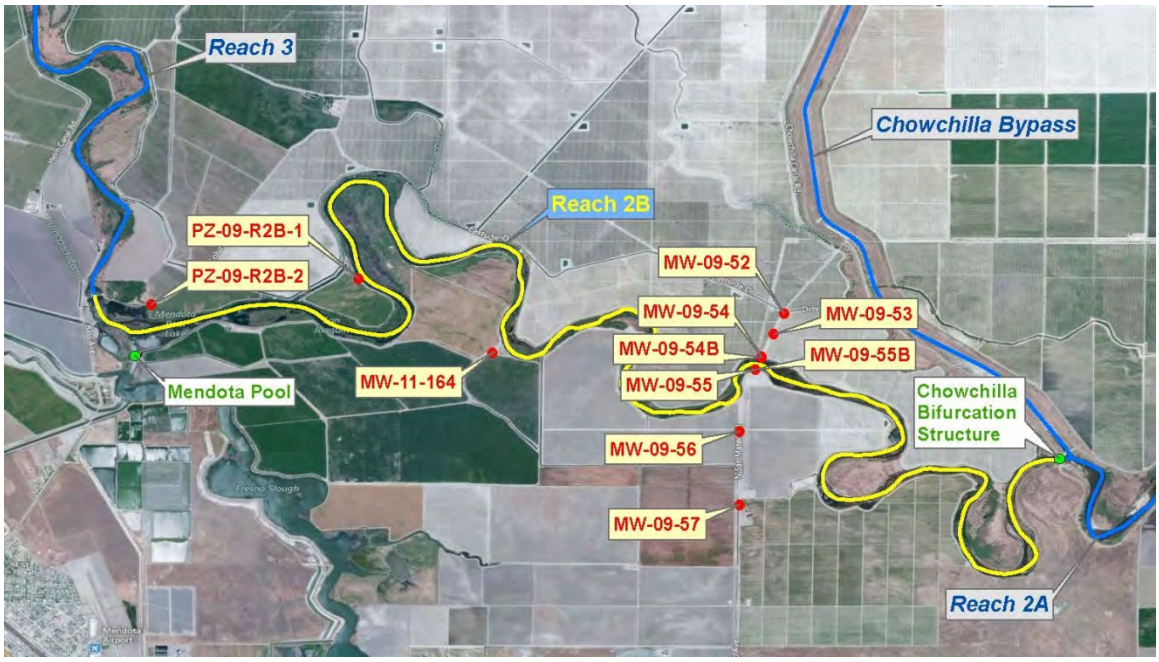
The San Joaquin Valley Groundwater Basin is composed of 16 subbasins: nine of these subbasins are located in the San Joaquin River hydrologic region and seven of these subbasins are located in the Tulare Lake hydrologic region (DWR 2006). The Project area is located within the Delta-Mendota subbasin, which is located within both the San Joaquin River hydrologic region and the Tulare Lake hydrologic region.

Groundwater in the Delta-Mendota subbasin occurs in three water-bearing zones within the Tulare Formation: terrace deposits, alluvium, and flood-basin deposits. The lower section of the Tulare Formation contains confined fresh water. The upper section of the Tulare Formation contains confined, semi-confined, and unconfined water. A shallow zone contains unconfined water approximately 25 feet or less below ground surface. The Corcoran Clay underlies the basin at depths that range from 100 to 500 feet below ground surface and acts as a confining layer.

Land subsidence has occurred in the Delta-Mendota subbasin due to historical groundwater level decline. Total subsidence near Mendota Pool reached nearly 9 feet by 2001, as compared to 1935 levels. Subsidence rates were greatest in the 1950s, with an average rate near Mendota Pool of 4.4 inches per year (in/year) between 1953 and 1957. Subsidence rates near Mendota Pool have been reduced in more recent years, with subsidence rates averaging 0.44 in/year between 1997 and 2001 and 0.04 in/year between 2003 and 2008 (Sneed et al. 2013).

Groundwater Conditions in the Project Area

The Program has collected groundwater data at several locations in the Project area (see Figure 13-6). The majority of these wells monitor shallow groundwater located within the top 20 to 30 feet below ground surface. Station MW-09-54B has real-time data available online at the California Data Exchange Center. At this station, depth to groundwater has ranged from approximately 8 feet to 20 feet below ground surface from February 2010 to July 2013. In Reach 2B, shallower groundwater levels correspond to flood and Interim and Restoration flows, while deeper groundwater corresponds to summer and low flow periods.



Source: SJRRP 2012a

Figure 13-6.
Reach 2B Monitoring Well Atlas

Salt management is one of the most serious long-term groundwater quality issues in the San Joaquin Valley. In this respect, the groundwater in Reach 2B is of relatively high quality. Electrical conductivity, a measure of salinity, at Station MW-09-54B has for the same period ranged from approximately 75 to 325 microsiemens per centimeter (µS/cm). These values are well below the salinity threshold of 1,500 µS/cm established for Reach 2B, as described in the Program's *Seepage Management Plan* (SJRRP 2014). Groundwater quality data for other parameters are limited, as seen in Mathany et al. (2013).

13.2 Regulatory Setting

This section presents applicable Federal, State, and local laws and regulations associated with groundwater resources in the Project area.

13.2.1 Federal

This section presents applicable Federal regulations associated with groundwater resources in the Project area and vicinity.

Clean Water Act

Section 402 of the Clean Water Act created the National Pollutant Discharge Elimination System (NPDES) permit program. This program covers point sources of pollution discharging into a surface water body, including dewatering of shallow groundwater. See Chapter 14.0, "Hydrology – Surface Water Resources and Water Quality," for a discussion of the Clean Water Act.

13.2.2 State of California

This section describes State regulations and policies associated with groundwater resources in the Project area and vicinity.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act is California's statutory authority for protecting groundwater quality. See Chapter 14.0, "Hydrology – Surface Water Resources and Water Quality," for a discussion of Porter-Cologne Water Quality Control Act.

Assembly Bill 3030 – Groundwater Management Act

The Groundwater Management Act (Assembly Bill [AB] 3030) is found in sections 10750–10756 of the California Water Code and provides a systematic procedure for an existing local agency to develop a groundwater management plan. AB 3030 gives the local agency the authority to develop a groundwater management plan in groundwater basins defined in DWR Bulletin 118 (DWR 2003) and to raise revenue to pay for facilities to manage the basin (extraction, recharge, conveyance, quality). AB 3030 consists of 12 technical components, but others may be identified in the groundwater management plan. An AB 3030 plan can be developed after a public hearing, and adoption of a resolution of intention to adopt a groundwater management plan. Groundwater management plans have been developed for a number of irrigation districts, counties, cities, and other private districts in the San Joaquin Valley Groundwater Basin, including the San Joaquin River Exchange Contractors Water Authority's *AB 3030 – Groundwater Management Plan* (2008), which covers the Project area.

Other Existing Management Policies

Existing law regarding groundwater is controlled by jurisdictional decisions. The California Water Code provides limited authority over groundwater use by allowing the formation of special districts (or water agencies) through general or special legislation. As reported in the PEIS/R (SJRRP 2011, page 12-50), DWR identifies nine groundwater management agencies formed by such special legislation, none of which are located in the Central Valley area.

Another means of groundwater management exists for surface water agencies that can show that surface water delivered to a given area recharges a local aquifer. Several agencies have used this statutory authority granted by the legislature to levy charges for groundwater extraction. The only agency in the San Joaquin Valley that has exercised this authority is the Rosedale-Rio Bravo Water Storage District in the Tulare Lake hydrologic region, which does not serve the Project area.

13.2.3 Regional and Local

This section provides information about the regional and local regulatory setting, policies, and programs associated with groundwater resources in the Project area and vicinity.

Fresno County General Plan

The Fresno County General Plan Policy Document (Fresno County 2000) outlines several policies for groundwater resources. These policies include the following.

- Policies OS-A.12 through OS-A.17 encourage groundwater recharge, water banking, local groundwater management, and aquifer recharge.
- Policy OSA.25 seeks to protect groundwater resources from contamination and overdraft.
- Policy PF-C.21 provides for new wells that are in close proximity to live streams or water courses.

Madera County General Plan

The Madera County General Plan Policy Document (Madera County 1995) outlines several policies designed to protect groundwater resources. For example, Policies 5.C.1 and 5.C.7 seeks to protect areas of groundwater recharge and to protect groundwater resources from contamination and further overdraft.

13.3 Environmental Consequences and Mitigation Measures

13.3.1 Impact Assessment Methodology

This section describes the impact assessment methodology used to evaluate potential impacts on groundwater resources. The analysis of the Project alternatives is both qualitative and quantitative in nature. Construction-related effects on groundwater were evaluated qualitatively based on review of regional groundwater information and the type of construction activities anticipated. The assessment of areas potentially affected by seepage was quantitative in nature and was based upon a cross-sectional seepage model developed for the Project area by the Program.

The quantitative approach was used to develop estimates of areas vulnerable to seepage and high water table effects associated with potential rises in groundwater levels in the Project area due to the implementation of Project alternatives. The aquifer response to a flow of 4,500 cubic feet per second (cfs) in the San Joaquin River was used to evaluate potential rise in groundwater elevations in the absence of seepage control measures. Results from this modeling represent “worst case” conditions because all Project alternatives would implement seepage control measures as part of the Project design.

The U.S. Geological Survey (USGS) Central Valley Hydrologic Model (CVHM), a valley-wide numerical groundwater flow model (USGS 2009), was used as a starting point for the cross-sectional seepage model. Specifically, CVHM was used as the basis for the development of a series of six, simplified cross-sectional seepage model profiles located at various distances along Reach 2B (Figure 13-7). The CVHM was not directly used because the aerial and vertical grid spacing is too coarse to evaluate groundwater levels immediately adjacent to the river (CVHM was constructed with a lateral grid size of 1 mile by 1 mile and a top layer thickness of 50 feet).

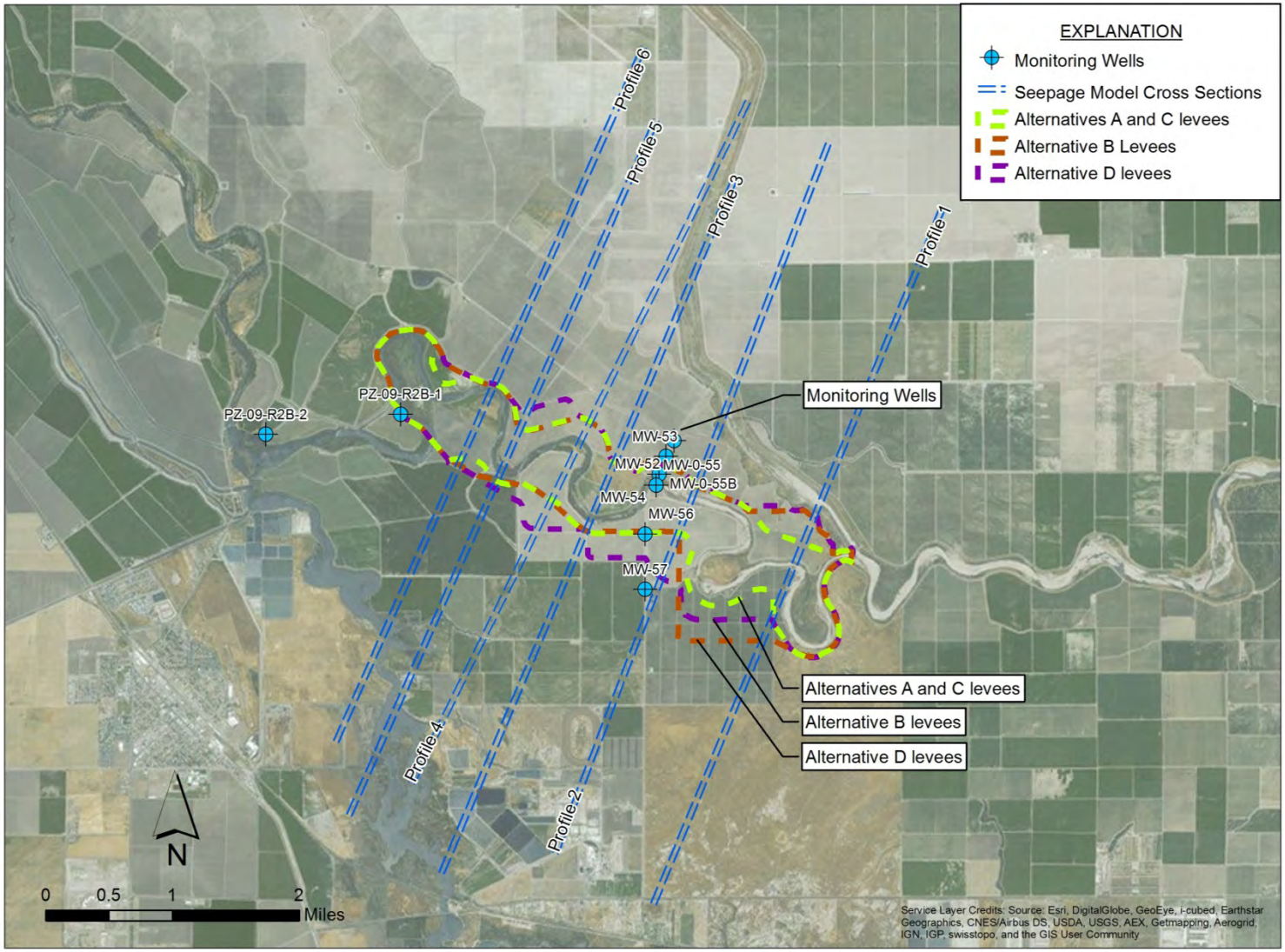


Figure 13-7.
Location of Cross Sectional Seepage Model Cross-Sections

USGS is currently updating CVHM to include the results of a Hydrologic Engineering Center River Analysis System (HEC-RAS) model for the Project area as well as refined grid spacing and layering for the purposes of assessing SJRRP groundwater impacts. The revised CVHM was not available for the Draft Environmental Impact Statement/Report (EIS/R).

Each of the six groundwater model profiles shown in Figure 13-7 is oriented perpendicular to the river channel, and extends approximately 3 miles in each direction away from the river. The profile locations were selected away from river meanders, if possible, in order to minimize numerical errors. Each profile model is composed of six layers, extending from the ground or river surface to the top of the regional confining aquifer unit, the Corcoran Clay. The lateral grid cell size at the river is 10 feet and gradually increases away from the river to a maximum of 400 feet.

The output from the existing HEC-RAS model was used to assign water levels in the river channel at each cross sectional profile. High resolution LiDAR (Light Detection and Ranging) data were incorporated into the model to account for variations in land surface topography. The depths to water simulated by the model[1] were compared with the significance criteria, described below. The distance from the levees at which simulated water level rises exceed the significance criteria were imported into a Geographic Information System (GIS) platform and interpolated spatially along the course of the river to estimate the acreage of land potentially impacted by rising groundwater as a result of Restoration Flows.

13.3.2 Significance Criteria

The thresholds of significance for groundwater impacts are based on the Environmental Checklist Form in Appendix G of the California Environmental Quality Act (CEQA) Guidelines, as amended. These thresholds also encompass factors taken into account under the National Environmental Policy Act (NEPA) to determine the significance of an action in terms of its context and the intensity of its effects. Impacts on groundwater resources would be significant if implementation of an Alternative would cause the following:

- A change in groundwater level resulting in long-term overdraft conditions for the groundwater basins.
- A change in groundwater level adjacent to the San Joaquin River resulting in increased groundwater levels in localized areas already experiencing high groundwater levels.
- A change in groundwater quality resulting in substantially adverse effects to designated beneficial uses of groundwater.

[1] The scenarios simulated by the cross sectional model were based on the initial alternatives evaluation (Project Description Technical Memorandum, Appendix A, SJRRP 2012b). The model scenarios that are comparable to the current alternatives are FP2, which simulates a narrow floodplain, and FP4, which simulates a wide floodplain.

13.3.3 Impacts and Mitigation Measures

This section provides an evaluation of direct and indirect effects of the Project Alternatives on groundwater. It includes analyses of potential effects relative to No-Action conditions in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. The analysis is organized by Project alternative with specific impact topics numbered sequentially under each alternative. With respect to groundwater, the environmental impact issues and concerns are:

1. Temporary Construction-Related Effects on Groundwater Quality.
2. Long-term Changes in Groundwater Quality.
3. Changes in Groundwater Levels.
4. Changes in Groundwater Recharge.

Other groundwater-related issues covered in the PEIS/R are not covered here because they are programmatic in nature and/or are not relevant to the Project area. Long-term overdraft as a result of Restoration Flows is also not anticipated due to the additional infiltration of river water to the regional aquifer system. Therefore, these issues are not applicable and are not discussed further.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the SJRRP would be implemented, including habitat restoration in other reaches, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, the proposed actions in other reaches would not achieve the Settlement goals. This section describes the impacts of the No-Action Alternative. The analysis is a comparison to existing conditions.

Impact GRW-1 (No-Action Alternative): ***Temporary Construction-Related Effects on Groundwater Quality.*** Under the No-Action Alternative, the Project would not be implemented and there would be no construction activities in the Project area. As a result, there would be **no impact** to groundwater quality from construction-related effects.

Impact GRW-2 (No-Action Alternative): ***Long-term Changes in Groundwater Quality.*** Under the No-Action Alternative, the quality of shallow groundwater is not anticipated to change substantially. Groundwater quality in the reach is influenced by the quality of the surface water that infiltrates locally. Because Millerton Lake is a source of high quality water with lower salinity than Mendota Pool, infiltration of Restoration Flows would improve the quality of shallow groundwater in the reach. Compared to existing conditions, there would be a **beneficial** effect on groundwater quality over time.

Impact GRW-3 (No-Action Alternative): ***Changes in Groundwater Levels.*** Prior to the start of Interim Flows in October 2009, portions of the Project area historically experienced groundwater seepage to adjacent lands during elevated flood flows. Seepage in Reach 2B has been observed at flows above 1,300 cfs when the Mendota Dam flashboards are in place (RMC 2007). Seepage in Reach 2B caused by high flows can be

reduced by removal of the flashboards and by opening the sluice gates at Mendota Dam in advance of high-flow conditions. This process lowers the water level in the pool during high flow events to reduce seepage impacts to adjacent lands.

Under the No-Action Alternative, flows could continue to affect areas outside of the levees that have historically experienced groundwater seepage. Increases in flow duration or frequency could affect adjacent agricultural lands by saturating soil in the rooting zone, impairing plant growth and survival, or interfering with the ability to use machinery to work soil. However, Program-level seepage management measures would be implemented in the Project area that would minimize impacts to areas near the river channel. Consequently, adverse effects to agricultural lands would be minimized. Compared to existing conditions, seepage-related impacts in the Project area would continue under the No-Action Alternative; however, Program-level seepage management measures would be implemented to minimize seepage-related effects. As a result, there would be a **less-than-significant** impact from changes in groundwater levels.

Impact GRW-4 (No-Action Alternative): ***Changes in Groundwater Recharge.*** Under the No-Action Alternative, Restoration Flows would be conveyed through Reach 2B. The No-Action Alternative would maintain the existing levee alignments and heights and maximum conveyance would continue to be limited to the existing channel capacity. Although the area for potential groundwater recharge would not change compared to existing conditions, flow would occur year-round for most water year types (see Figure 1-10) resulting in groundwater recharge in previously dry sections of the river (i.e., the river channel above the San Joaquin River arm of Mendota Pool). As a result, there would be a **beneficial** effect on groundwater recharge in the Project area.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would include construction of Project facilities including a Compact Bypass channel, a new levee system encompassing the river channel with a narrow floodplain, and the South Canal. The Reach 2B floodplain would have an average width of approximately 3,000 feet. Other key features include construction of the Mendota Pool Dike (separating the San Joaquin River and Mendota Pool), a fish barrier below Mendota Dam, and the South Canal bifurcation structure with fish passage facility and fish screen, modification of the San Mateo Avenue crossing, and the removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Impact GRW-1 (Alternative A): ***Temporary Construction-Related Effects on Groundwater Quality.*** Construction associated with channel and structural improvements under Alternative A could temporarily influence surface water quality, and could potentially lead to changes in groundwater quality. Compared to the No-Action Alternative, construction activities under Alternative A could discharge waste petroleum products or other construction-related substances that could enter waterways in runoff. In addition, chemicals associated with operating heavy machinery would be used, transported, and stored onsite during construction activities. These substances could be inadvertently introduced into the San Joaquin River through site runoff or onsite spills. Sediment and chemicals could degrade water quality in the San Joaquin River. This

would potentially affect groundwater quality through percolation from the soil surface or surface water interaction with underlying groundwater. Furthermore, the Project could potentially impact groundwater quality through discharges of dewatering effluent if groundwater is encountered during construction.

When comparing Alternative A to existing conditions, impacts to groundwater quality from potential discharges of chemicals through site runoff or onsite spills would be similar to those described above (i.e., the comparison of Alternative A to the No-Action Alternative). These impacts to groundwater quality would be **potentially significant**.

Mitigation Measure GRW-1A (Alternative A): ***Prepare and Implement a Stormwater Pollution Prevention Plan.*** This mitigation measure is the same as Mitigation Measure SWQ-1 (Alternative A), as described in Chapter 14.0, "Hydrology – Surface Water Quality." Construction activities are subject to construction-related stormwater permit requirements of the Federal Clean Water Act's NPDES program. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared that identifies best management practices (BMPs) to prevent or minimize the introduction of contaminants into surface waters. The SWPPP will detail the construction-phase housekeeping measures for control of contaminants, as well as the treatment measures and BMPs to be implemented for control of pollutants once the Project has been constructed. The SWPPP will establish good housekeeping measures such as construction vehicle storage and maintenance, handling procedures for hazardous materials, and waste management best management practices. They include procedural and structural measures to prevent release of wastes and materials used at the site. Implementation of the SWPPP would avoid or reduce runoff pollutants at the construction sites to the "maximum extent practicable."

Implementation Action: The Project proponents and/or construction contractor will prepare and implement an SWPPP consistent with requirements in the Statewide NPDES Construction General Permit. The SWPPP will set forth a best management practice monitoring, maintenance, and reporting schedule and will identify the responsible entities during the construction and post-construction phases. Monitoring will include visual inspections of the best management practices, inspection for non-stormwater discharges, and visual inspection and/or sample collection of stormwater discharges. If monitoring results indicate polluted discharges, a construction site and run-on evaluation will be conducted to determine the source of the pollutant and corrective actions will be implemented immediately if necessary.

Location: Project areas with active construction or used by construction personnel, including access roads, staging and storage areas, borrow sites, within the river channel and on adjacent uplands.

Effectiveness Criteria: Performance tracking will be based on successful compliance with the Statewide NPDES Construction General Permit.

Responsible Agency: Reclamation and the construction contractor.

Monitoring/Reporting Action: At a minimum, annual reports will be submitted to the State Water Resources Control Board via the Storm Water Multiple Application and Report Tracking System.

Timing: The SWPPP will be developed prior to construction and will be implemented during construction.

Mitigation Measure GRW-1B (Alternative A): ***Prepare and Implement a Construction Groundwater Management Plan.*** The Project proponents and/or construction contractor will prepare and implement a Construction Groundwater Management Plan that includes a protocol for sampling and analyzing the quality of dewatering effluent during construction for comparison with existing groundwater. This plan will be consistent with the monitoring and reporting program required by the Statewide NPDES Construction General Permit and/or RWQCB's NPDES Permit for *Dewatering and Other Low Threat Discharges to Surface Waters*, Order No. R5-2013-0074 (General Permit for Low Threat Discharges).[2]

Implementation Action: The Project proponents and/or construction contractor will prepare and implement a Construction Groundwater Management Plan. The plan will include a protocol for sampling and analysis of dewatering effluent during construction and include a description of the sampling methods, locations, and frequency, the constituents monitored, and how the receiving waters will be visually inspected. If monitoring results indicate polluted effluent, a Report of Waste Discharge will be filed with the RWQCB to initiate consultations to obtain a Waste Discharge Order specifying approved treatment methods and disposal options.

Location: Project areas with active dewatering.

Effectiveness Criteria: Performance tracking of this mitigation measure will be based upon successful compliance with the Statewide NPDES Construction General Permit and/or General Permit for Low Threat Discharges.

Responsible Agency: Reclamation and the construction contractor.

Monitoring/Reporting Action: At a minimum, annual reports will be submitted to Reclamation managers summarizing the monitoring data obtained during the previous year(s).

Timing: The Construction Groundwater Management Plan will be developed prior to construction and will be implemented during construction.

Impacts to groundwater quality would be **less than significant** after mitigation.

[2] The General Permit for Low Threat Discharges covers construction dewatering when the discharges do not contain significant quantities of pollutants and they are either 4 months or less in duration or have a daily average discharge flow that does not exceed 0.25 million gallons per day.

Impact GRW-2 (Alternative A): ***Long-term Changes in Groundwater Quality.*** Compared to the No-Action Alternative, implementation of Alternative A would construct new levees set back from the San Joaquin River, expand the floodplain, and increase the conveyance capacity of the reach. Groundwater in the reach is influenced by soil quality and surface water that infiltrates locally. Conversion of previously irrigated agricultural lands into floodplain areas would reduce new sources of nutrients and pesticides that could influence groundwater quality locally.

Alternative A also includes passive riparian habitat restoration and compatible agricultural practices in the floodplain (e.g., annual crops, pasture, or floodplain-compatible permanent crops). Similar to No-Action conditions, where irrigation of agricultural lands would influence the quality of the shallow aquifer, floodplain inundation of agricultural areas would facilitate movement of nutrients and other materials into the shallow aquifer. However, unlike No-Action conditions, nutrient cycling and pollutant uptake following high flow events on the floodplain would be supported by native aquatic, riparian, and floodplain vegetation.

Compared to existing conditions, surface water quality in Reach 2B would primarily be influenced by San Joaquin River flows (instead of other inflows to Mendota Pool) under Alternative A. Because Millerton Lake is a source of high quality water with lower salinity than Mendota Pool, infiltration of river flows could improve the quality of shallow groundwater in Reach 2B. This would be a **beneficial** effect to long-term groundwater quality.

Impact GRW-3 (Alternative A): ***Changes in Groundwater Levels.*** Restoration Flows could cause changes to groundwater levels in Reach 2B in areas adjacent to the San Joaquin River. Drainage problem areas were defined in the SJVDP (DWR 2005) as locations where the water table is within 5 feet of the ground surface. Potential impacts from the Project have been evaluated in relation to similar thresholds: acres of land outside the proposed levee alignments anticipated to have shallow groundwater elevations above 5 and 7 feet below ground surface. These thresholds represent a range of depths where waterlogging of crops and root-zone salinization may affect adjacent land uses. As described in Section 13.3.1, groundwater levels associated with the conveyance capacity of the reach (4,500 cfs) have been simulated and the acreage of land above these thresholds have been quantified in GIS.

Modeling results indicate the potential presence of shallow groundwater levels above the thresholds of 5 and 7 feet below ground surface along the edges of the San Joaquin River levees in the absence of seepage control measures. Based on the model results, the area outside of the levee alignments with simulated depth to groundwater less than 5 feet is 320 acres and an additional 60 acres is simulated to have depth to groundwater between 5 and 7 feet when river flows are at 4,500 cfs. Figure 13-8 shows the potential areas with depths to groundwater less than monitoring thresholds for the narrow floodplain alternatives, which includes Alternative A. The model shows that infiltration and seepage from the river migrates primarily downward to the water table. The mound of groundwater produced from this infiltration and seepage does not extend more than 1,000 feet laterally from the river.

Under Alternative A, newly constructed levees would be set back from the San Joaquin River such that the Reach 2B floodplain would have an average width of approximately 3,000 feet. Although shallow groundwater could potentially be present and effect adjacent land uses, levee design includes implementation of seepage control measures.

Seepage of river water through or under levees is a concern for levee integrity and adjacent land uses. Through-seepage, water that seeps laterally through the levee section, would be addressed through proper levee design and construction (e.g., selection of low porosity materials and proper compaction). Under-seepage, water that seeps laterally by travelling under the levee section, is primarily controlled by the native soils beneath the levee and seepage control measures would be included where native soils do not provide sufficient control. Seepage control measures would be included, as part of the Project, in in areas where under-seepage is likely to affect adjacent land uses. Seepage control measures could include slurry walls, interceptor drains, seepage wells, seepage berms, land acquisition (fee title or seepage easements) and other measures that can be implemented within the Project area (see Section 2.2.4).

In addition to Project design features, seepage management would be implemented during Project operations. Areas of high groundwater would be identified in accordance with the Program's *Seepage Management Plan* (SJRRP 2014). Once identified, the Program's *Seepage Management Plan* would be implemented to identify measures that would be taken to reduce potential impacts. Through these actions, potential adverse effects of an elevated groundwater level, such as waterlogging of crops and mobilizing of salts in the soil profile, would be further avoided or substantially reduced. Seepage impacts to adjacent lands (outside of the floodplain proposed under Alternative A) are likely to be similar to or less than seepage impacts to adjacent lands (outside of the existing levee alignment) under the No-Action Alternative.

Compared to existing conditions, groundwater levels would likely increase in areas outside of the floodplain proposed under Alternative A, however, seepage impacts would be avoided or substantially reduced by implementation of Project design features and seepage management measures. Therefore, impacts would be **less than significant**.

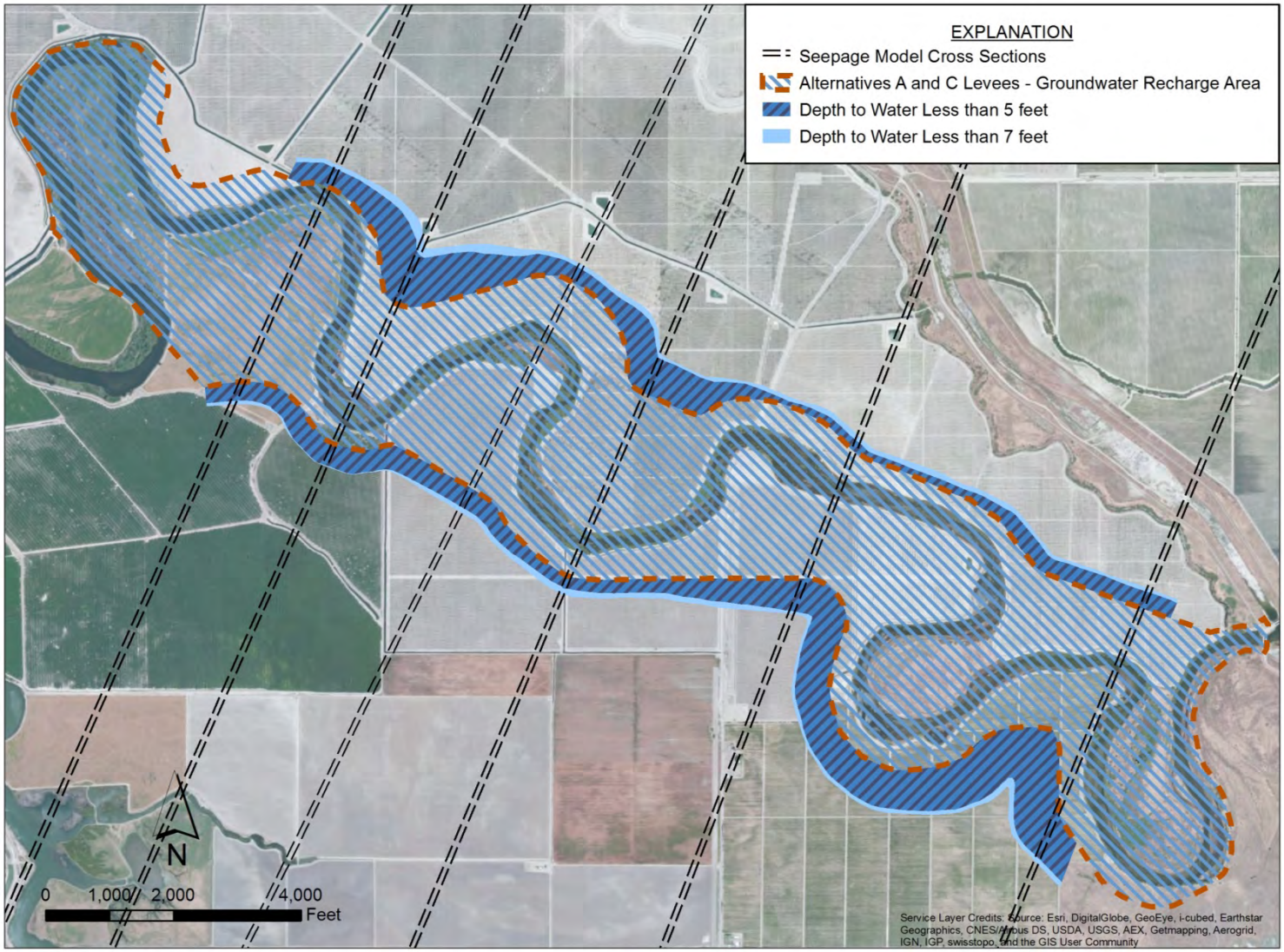


Figure 13-8.
Potential Areas with Depths to Groundwater Less than Monitoring Thresholds – Alternatives A and C

Impact GRW-4 (Alternative A): ***Changes in Groundwater Recharge.*** Compared to the No-Action Alternative, Action Alternatives would construct new levees set back from the San Joaquin River, expand the floodplain, and increase the conveyance capacity of the reach to 4,500 cfs. Under Alternative A the floodplain would have an average width of approximately 3,000 feet. Flow would be conveyed though Reach 2B in the river channel and floodplain providing opportunities for groundwater recharge. Floodplain and channel grading would be used to increase inundation areas during high flow events, remove high areas where flow connectivity would be impeded, and to create floodplain benches adjacent to the river channel to increase the frequency of inundation (see Section 2.2.4). Increasing inundation areas and inundation frequencies would facilitate groundwater recharge in the reach.

Compared to existing conditions, flow would also occur year-round for most water year types (see Figure 1-10) resulting in groundwater recharge in previously dry sections of the river (i.e., in the river channel above the San Joaquin River arm of Mendota Pool). As a result, there would be a **beneficial** effect on groundwater recharge in the Project area.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B would include construction of Project features including a Compact Bypass channel, a new levee system with a wide, consensus-based floodplain encompassing the river channel, and the Compact Bypass Bifurcation Structure with fish passage facility and fish screen. Other key features include construction of a fish passage facility at the San Joaquin River control structure at the Chowchilla Bifurcation Structure, the re-route of Drive 10 ½ (across the Compact Bypass control structure), and removal of San Mateo Avenue crossing. Construction activity is expected to occur intermittently over an approximate 157-month timeframe. The Reach 2B floodplain would have an average width of approximately 4,200 feet.

Impact GRW-1 (Alternative B): ***Temporary Construction-Related Effects on Groundwater Quality.*** Construction associated with channel and structural improvements under Alternative B could temporary influence water quality, and could potentially lead to changes in groundwater quality. Refer to Impact GRW-1 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. These impacts would be **potentially significant**.

Mitigation Measures GRW-1A and GRW-1B (Alternative B): ***Prepare and Implement a Stormwater Pollution Prevention Plan, Prepare and Implement a Construction Groundwater Management Plan.*** Refer to Mitigation Measures GRW-1A and GRW-1B (Alternative A). The same measures would be used here. Impacts would be **less than significant** after mitigation.

Impact GRW-2 (Alternative B): ***Long-term Changes in Groundwater Quality.*** Refer to Impact GRW-2 (Alternative A). Potential effects of Alternative B would be the same as potential effects of Alternative A. Conversion of previously irrigated agricultural lands into floodplain areas would reduce new sources of nutrients and pesticides that could influence groundwater quality locally. These effects would be **beneficial**.

Impact GRW-3 (Alternative B): ***Changes in Groundwater Levels.*** Modeling results indicate the potential presence of shallow groundwater levels above the thresholds of 5- and 7-feet below ground surface along the edges of the San Joaquin River. Based on the model results, the area outside of the levee alignments with simulated depth to water less than 5 feet is 360 acres and an additional 80 acres have simulated depth of 5 to 7 feet below ground surface. Figure 13-9 shows the potential areas with depths to groundwater less than monitoring thresholds for the wide floodplain alternatives, including Alternative B. Similar to Alternative A, the model shows that infiltration and seepage from the river migrates primarily downward to the water table. The mound of groundwater produced from this infiltration and seepage does not extend more than 1,000 feet laterally from the river.

Through levee design features and seepage management measures, as described in Impact GRW-2 (Alternative A), potential adverse effects of an elevated groundwater level, such as waterlogging of crops and mobilizing of salts in the soil profile, would be avoided or substantially reduced in Alternative B. Compared to the No-Action Alternative, seepage impacts to adjacent lands under Alternative B are likely to be similar to or less than seepage impacts to adjacent lands under the No-Action Alternative.

Compared to existing conditions, groundwater levels would likely increase in areas immediately adjacent to San Joaquin River levees, however, seepage impacts would be avoided or substantially reduced by implementation of Project design features and seepage management measures. Therefore, these impacts would be **less than significant**.

Impact GRW-4 (Alternative B): ***Changes in Groundwater Recharge.*** Refer to Impact GRW-4 (Alternative A). Potential effects of Alternative B would be similar to potential effects of Alternative A, with the exception that the floodplain would have an average width of approximately 4,200 feet. Increasing inundation areas and inundation frequencies would facilitate groundwater infiltration causing a **beneficial** effect on groundwater recharge.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C would include construction of Project features including Fresno Slough Dam, a new levee system with a narrow floodplain encompassing the river channel, and the Short Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the Short Canal control structure and fish screen, the Chowchilla Bifurcation Structure fish passage facility, modification of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe. The Reach 2B floodplain would have an average width of approximately 3,000 feet.

Impact GRW-1 (Alternative C): ***Temporary Construction-Related Effects on Groundwater Quality.*** Construction associated with channel and structural improvements under Alternative C could temporary influence water quality, and could potentially lead to changes in groundwater quality. Refer to GRW-1 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A. These impacts would be **potentially significant**.

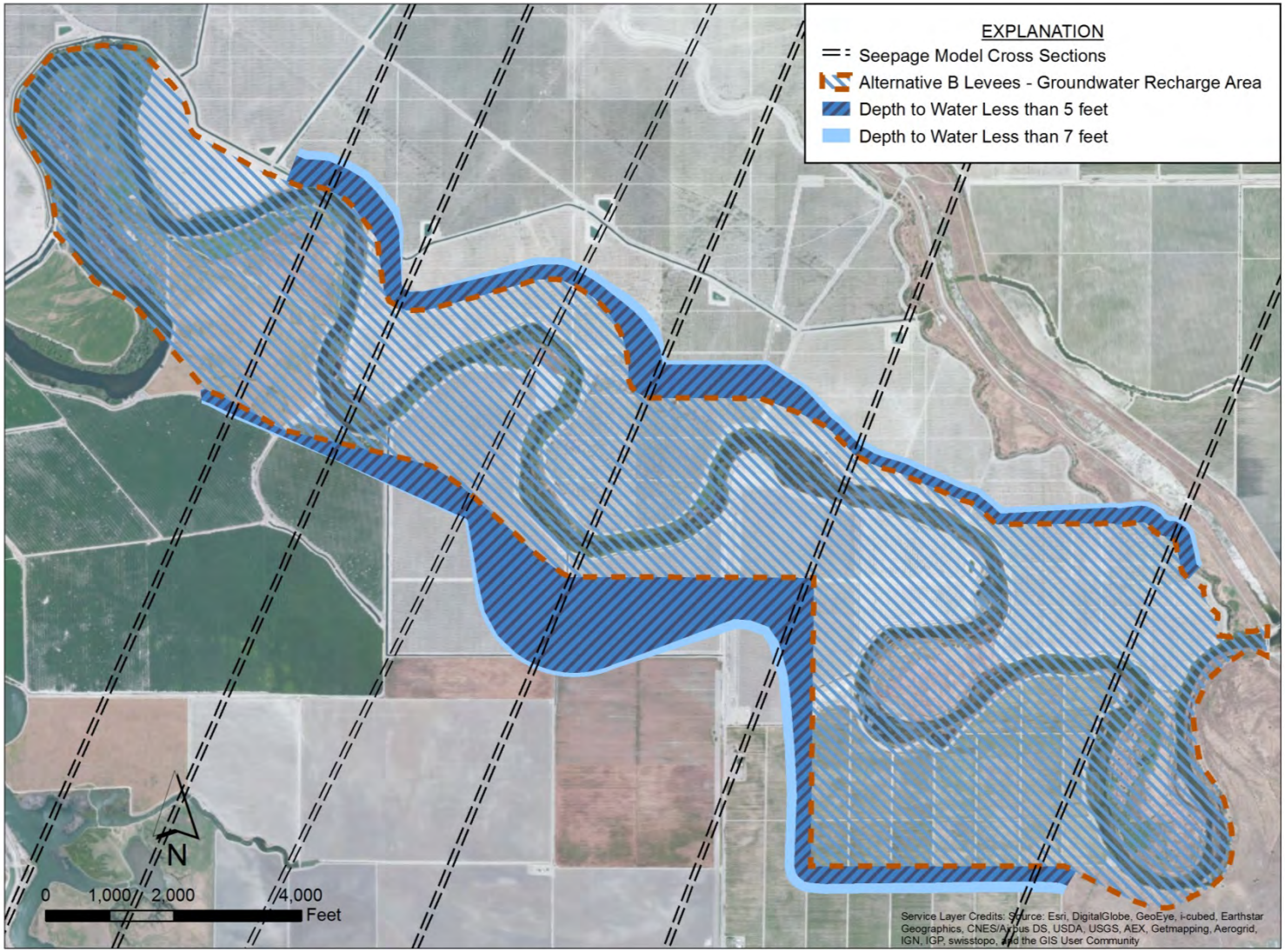


Figure 13-9.
Potential Areas with Depths to Groundwater Less than Monitoring Thresholds – Alternative B

Mitigation Measures GRW-1A and GRW-1B (Alternative C): ***Prepare and Implement a Stormwater Pollution Prevention Plan, Prepare and Implement a Construction Groundwater Management Plan.*** Refer to Mitigation Measures GRW-1A and GRW-1B (Alternative A). The same measures would be used here. Impacts would be **less than significant** after mitigation.

Impact GRW-2 (Alternative C): ***Long-term Changes in Groundwater Quality.*** Refer to Impact GRW-2 (Alternative A). Potential effects of Alternative C would be the same as potential effects of Alternative A, with the exception that agricultural practices would not occur on the floodplain. Conversion of previously irrigated agricultural lands into floodplain areas would reduce new sources of nutrients and pesticides that could influence groundwater quality locally. These effects would be **beneficial**.

Impact GRW-3 (Alternative C): ***Changes in Groundwater Levels.*** Refer to Impact GRW-3 (Alternative A). The impacts to groundwater levels for Alternative C would be the same as for Alternative A because both alternatives involve a narrow floodplain. These impacts would be **less than significant**.

Impact GRW-4 (Alternative C): ***Changes in Groundwater Recharge.*** Refer to Impact GRW-4 (Alternative A). Potential effects of Alternative C would be the same as potential effects of Alternative A. Increasing inundation areas and inundation frequencies would facilitate groundwater infiltration causing a **beneficial** effect on groundwater recharge.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D would include construction of Project features including Fresno Slough Dam, a new levee system with a wide floodplain encompassing the river channel, and the North Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the North Canal bifurcation structure with fish passage facility and fish screen, removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure, removal of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 158-month timeframe. The Reach 2B floodplain would have an average width of approximately 4,200 feet.

Impact GRW-1 (Alternative D): ***Temporary Construction-Related Effects on Groundwater Quality.*** Construction associated with channel and structural improvements under Alternative D could temporary influence water quality, and could potentially lead to changes in groundwater quality. Refer to Impact GRW-1 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A. These impacts would be **potentially significant**.

Mitigation Measures GRW-1A and GRW-1B (Alternative D): ***Prepare and Implement a Stormwater Pollution Prevention Plan, Prepare and Implement a Construction Groundwater Management Plan.*** Refer to Mitigation Measures GRW-1A and GRW-1B (Alternative A). The same measures would be used here. Impacts would be **less than significant** after mitigation.

Impact GRW-2 (Alternative D): ***Long-term Changes in Groundwater Quality.*** Refer to Impact GRW-2 (Alternative A). Potential effects of Alternative D would be the same as potential effects of Alternative A. Conversion of previously irrigated agricultural lands into floodplain areas would reduce new sources of nutrients and pesticides that could influence groundwater quality locally. These effects would be **beneficial**.

Impact GRW-3 (Alternative D): ***Changes in Groundwater Levels.*** Modeling results indicate the potential presence of shallow groundwater levels above the thresholds of 5- and 7-feet below ground surface along the edges of the San Joaquin River. Based on the model results, the area outside of the levee alignments with simulated depth to water less than 5 feet is 330 acres and an additional 70 acres have simulated depth of 5 to 7 feet below ground surface. Figure 13-10 shows the potential areas with depths to groundwater less than monitoring thresholds for the wide floodplain alternatives, including Alternative D. Similar to Alternative A, the model shows that infiltration and seepage from the river migrates primarily downward to the water table. The mound of groundwater produced from this infiltration and seepage does not extend more than 1,000 feet laterally from the river.

Through levee design features and seepage management measures, as described in Impact GRW-2 (Alternative A), potential adverse effects of an elevated groundwater level, such as waterlogging of crops and mobilizing of salts in the soil profile, would be avoided or substantially reduced in Alternative D. Compared to the No-Action Alternative, seepage impacts to adjacent lands under Alternative D are likely to be similar to or less than seepage impacts to adjacent lands under the No-Action Alternative.

Compared to existing conditions, groundwater levels would likely increase in areas immediately adjacent to San Joaquin River levees, however, seepage impacts would be avoided or substantially reduced by implementation of Project design features and seepage management measures. Therefore, these impacts would be **less than significant**.

Impact GRW-4 (Alternative D): ***Changes in Groundwater Recharge.*** Refer to Impact GRW-4 (Alternative A). Potential effects of Alternative D would be similar to potential effects of Alternative A, with the exception that the floodplain would have an average width of approximately 4,200 feet. Increasing inundation areas and inundation frequencies would facilitate groundwater infiltration causing a beneficial effect on groundwater recharge.

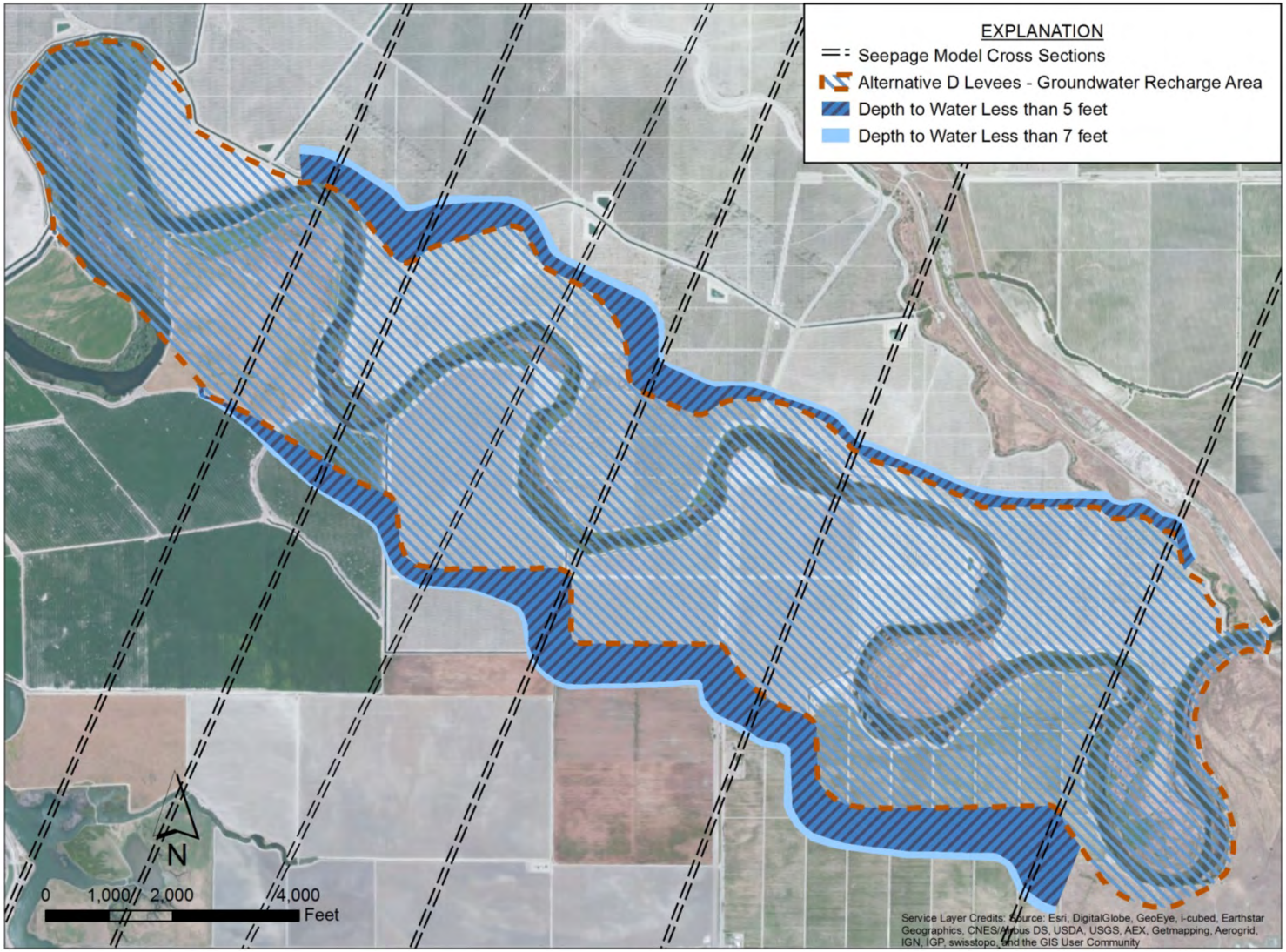


Figure 13-10.
Potential Areas with Depths to Groundwater Less than Monitoring Thresholds – Alternative D

14.0 Hydrology - Surface Water Resources and Water Quality

This section describes the potential impacts that implementation of Project alternatives may have on surface water resources and water quality at the Project area, and explains the environmental setting, applicable regulatory framework, and appropriate mitigation measures.

14.1 Environmental Setting

14.1.1 Physical Conditions

Reach 2B of the San Joaquin River is the 11.2-mile reach between the Chowchilla Bifurcation Structure (river mile [RM] 216) and Mendota Dam (RM 204.8). The Project footprint also includes areas outside of the immediate riparian corridor of Reach 2B that may be affected directly or indirectly by implementing Project alternatives. These areas include the existing levee-confined channel and overbank areas, areas below Mendota Dam, the Compact Bypass area and its discharge point at Reach 3, Fresno Slough, proposed canal alignments that would convey flows from an upstream point along Reach 2B to Fresno Slough, and potential upland borrow areas.

Areas outside of the current levee-contained channel, Mendota Pool, and Fresno Slough are primarily in agricultural production (e.g., alfalfa/field crops, winter vegetables, vineyards, orchards, livestock, etc.) with associated irrigation ditches, and public and private access roads.

Climate

The climate within the Project area and vicinity is semi-arid, with long, hot, dry summers and relatively mild winters. Winter temperatures on the San Joaquin valley floor are usually mild, but drop below freezing during occasional cold spells. Frost occurs in most fall/winter seasons, typically between late November and early March. Monthly average temperature based on long-term records for several weather stations are presented in Table 14-1. Based on these long-term records, the monthly average of the minimum daily temperature ranges from 36 to 66 degrees Fahrenheit (°F), and the monthly average of the maximum daily temperature ranges from 54 to 100°F.

Based on long-term records of precipitation, the average annual precipitation in the Project area is approximately 8.0 inches but increases moving easterly towards the mountains as the elevation increases (Table 14-2). Approximately 90 percent of precipitation in the Project area occurs from November through April. Heavy rainfall and snow in the western Sierra Nevada are the major sources of water in the San Joaquin River Basin. In the Sierra Nevada, the majority of the mean annual precipitation falls as snow and ranges from 20 inches in the foothills to over 80 inches at higher elevations.

The snow that remains after winter serves as stored water before it melts in the spring and summer.

Table 14-1.
Temperature Summary

Station and Metric	Temperature (°F)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Friant Dam (1912-2010)													
Average Max.	55.3	61.3	66.4	73.9	84.1	93	100.4	98.7	92.5	81.2	66.6	56.4	77.5
Average Min.	36.7	39.7	41.2	43.5	49.4	55.4	61	59.4	55.8	49.3	41.6	36.7	47.5
Madera, CA (1928-2010)													
Average Max.	53.9	61.2	67.2	74.8	83.9	91.7	98.2	96.4	90.9	80.3	66.1	55.1	76.7
Average Min.	35.9	39.1	41.7	45.4	51.4	56.7	61.4	59.8	55.2	47.7	39.6	35.7	47.5
Fresno, CA (1948-2010)													
Average Max.	54.5	61.5	67	74.5	83.5	91.7	98.3	96.3	90.6	79.7	65.3	54.7	76.5
Average Min.	37.6	40.7	43.8	47.9	54.3	60.5	65.7	63.9	59.5	51.1	42.4	37.3	50.4

Source: Western Region Climate Center 2011, Stations Friant Government Camp, California (043261), Madera, California (045233), Fresno WSO AP, California (043257)

Table 14-2.
Average Monthly Precipitation

Station	Precipitation (inches)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Friant Dam	2.76	2.60	2.23	1.28	0.46	0.13	0.01	0.01	0.20	0.80	1.48	2.34	14.31
Madera, CA	2.01	1.94	1.78	1.09	0.40	0.09	0.01	0.02	0.14	0.58	1.18	1.80	11.05
Fresno, CA	2.11	1.92	1.85	1.03	0.36	0.14	0.01	0.01	0.16	0.52	1.13	1.66	10.90
Mendota Dam	1.47	1.26	1.29	0.88	0.27	0.04	0.01	0.01	0.21	0.35	0.98	1.21	7.98

Source: Western Region Climate Center 2011

Notes:

Friant Government Camp, California (043261), Period of record: 1912-2010, Elevation: 350 feet

Madera, California (045233), Period of record: 1928-2010, Elevation: 275 feet.

Fresno WSO AP, California (043257), Period of record: 1948-2010, Elevation: 335 feet.

Mendota Dam, California (045528), Period of record: 1948-1984, Elevation: 163 feet.

14.1.2 Surface Water Resources

Reach 2B is located on the San Joaquin River between the Chowchilla Bifurcation Structure and Mendota Dam (see Figure 1-2). Major river systems that can contribute to flow to Reach 2B include the San Joaquin River and Kings River systems (Figure 14-1).

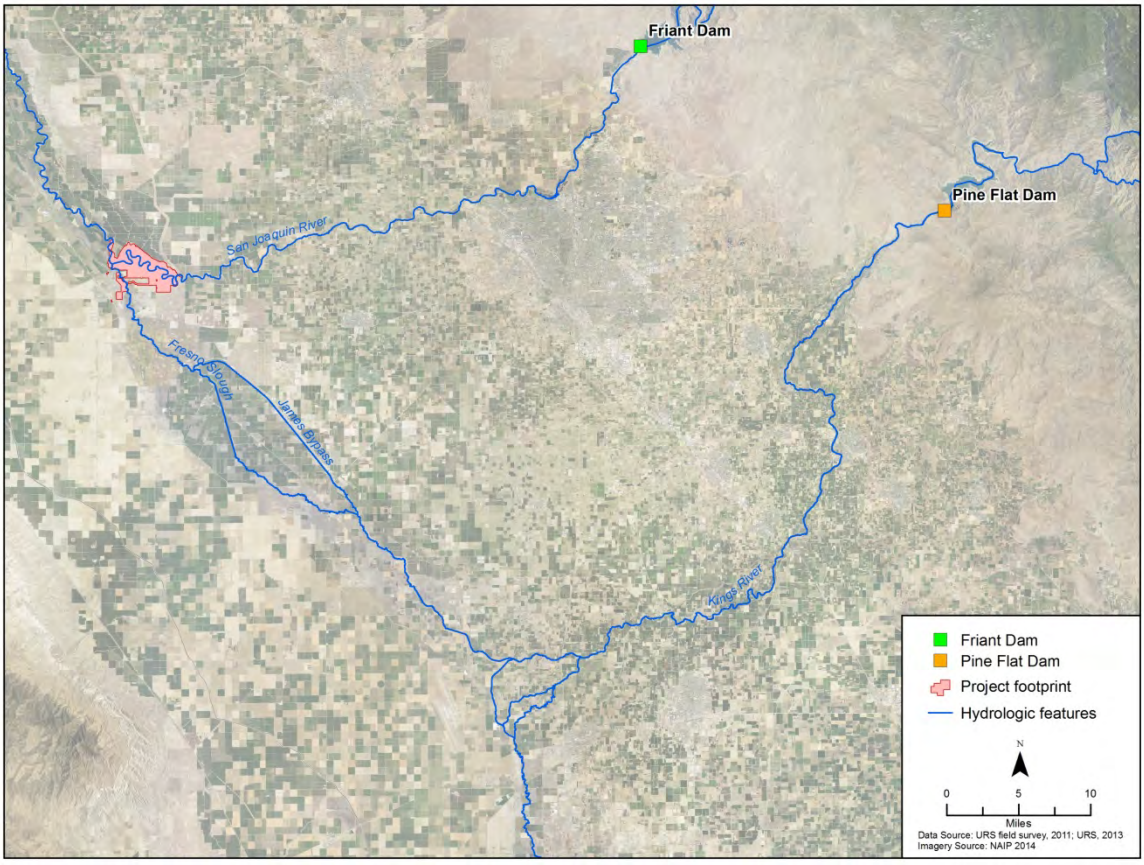


Figure 14-1.
Major River Systems Upstream of Reach 2B

San Joaquin River

The San Joaquin River flows generally northwest through the Central Valley before discharging into the Sacramento-San Joaquin Delta. Reach 2B is a segment of the San Joaquin River. This reach has a sandbed channel confined by earthen levees with an original design conveyance capacity of 2,500 cubic feet per second (cfs).

Flows in Reach 2B are almost entirely regulated by releases from Friant Dam. Friant Dam forms Millerton Lake and is located 51.6 miles upstream of Reach 2B at RM 267.6. Constructed in 1948 with a storage capacity of 520.5 thousand acre-feet (TAF), Millerton Lake provides irrigation water to agricultural users in Fresno, Madera, Kern and Tulare Counties through the Friant-Kern and Madera Canals (San Joaquin River Restoration Program [SJRRP] 2008). Releases from Millerton Lake to the San Joaquin River have typically ranged from 180 to 250 cfs during the May to October irrigation season and from 40 to 100 cfs during the winter (SJRRP 2009). Additional releases occur when the

170 TAF flood storage capacity of Millerton Lake is exceeded. The greatest risk of flooding occurs during warm rain-on-snow events in winter months or at the peak of the spring snowmelt. Prior to implementation of the Interim Flows program on October 1, 2009, flows up to 5,500 cfs were typically diverted to the Chowchilla Bypass at the Chowchilla Bifurcation Structure located at the upstream end of Reach 2B, although the operating rules allow discretion in passing first flows to the downstream river rather than into the Chowchilla Bypass. Flood flows reached the Mendota Pool at the lower end of Reach 2B in 1997, 2001, 2005, 2006, 2007, and 2011 (SJRRP 2009). Table 14-3 lists average, minimum, and maximum flow rates for several gaging stations in the Project area and vicinity. Figure 14-2 indicates the location of these gages.

Table 14-3.
Flow Averages and Ranges at Flow Stations in the Project Vicinity

Station (Station ID)	Period prior to Interim Flows			WY 2010 and 2011[a]	
	Average Flow (cfs)	Range of Flow (cfs)	Period	Average Flow (cfs)	Range of Flow (cfs)
San Joaquin River below Friant (SJF)	629	11 – 36,800	1911 – 2011	1212	31 – 7,794
San Joaquin River at Gravelly Ford (GRF)	441	0 – 10,283	1997 – 2009	1,093	0 – 7,407
Chowchilla Bypass (CBP)	366	0 – 7,341	1997 – 2009	665	0 – 8,348
San Joaquin River below Bifurcation (SJB)	167	0 – 2,434	1990 – 2002, 2005 – 2009	308	0 – 1,415
San Joaquin River at San Mateo Road Crossing Near Mendota (SJN)	NA	NA	NA	501[b]	121 – 1,425
San Joaquin River near Mendota, CA (MEN)	496	0 - 5,906	1993 – 2009	621	0 – 3,570
James Bypass Near San Joaquin, CA (JBP)	343	0 - 5,360	1976 – 2009	1,138	0 – 4,441

Source: SJRRP 2011a, DWR 2011, USGS 2011

Notes:

[a] Includes both Interim Flows and flood flows.

[b] The period of record is from February 2010 to September 2011.

Key:

cfs = cubic feet per second

WY = water year

Prior to the Interim Flows program, the upper half of Reach 2B above the San Mateo Avenue crossing at RM 211.8 was generally dry and flow would reach Mendota Pool from Reach 2B only during periods of flood management releases. The lower half of Reach 2B (RM 204.8 to 211.8) is backwatered by Mendota Dam. With the exception of Fresno Slough which discharges flood flows from the Kings River system to Mendota Pool, there are no natural tributaries in Reach 2B. Agricultural return flows within the reach are reportedly minor (SJRRP 2009).

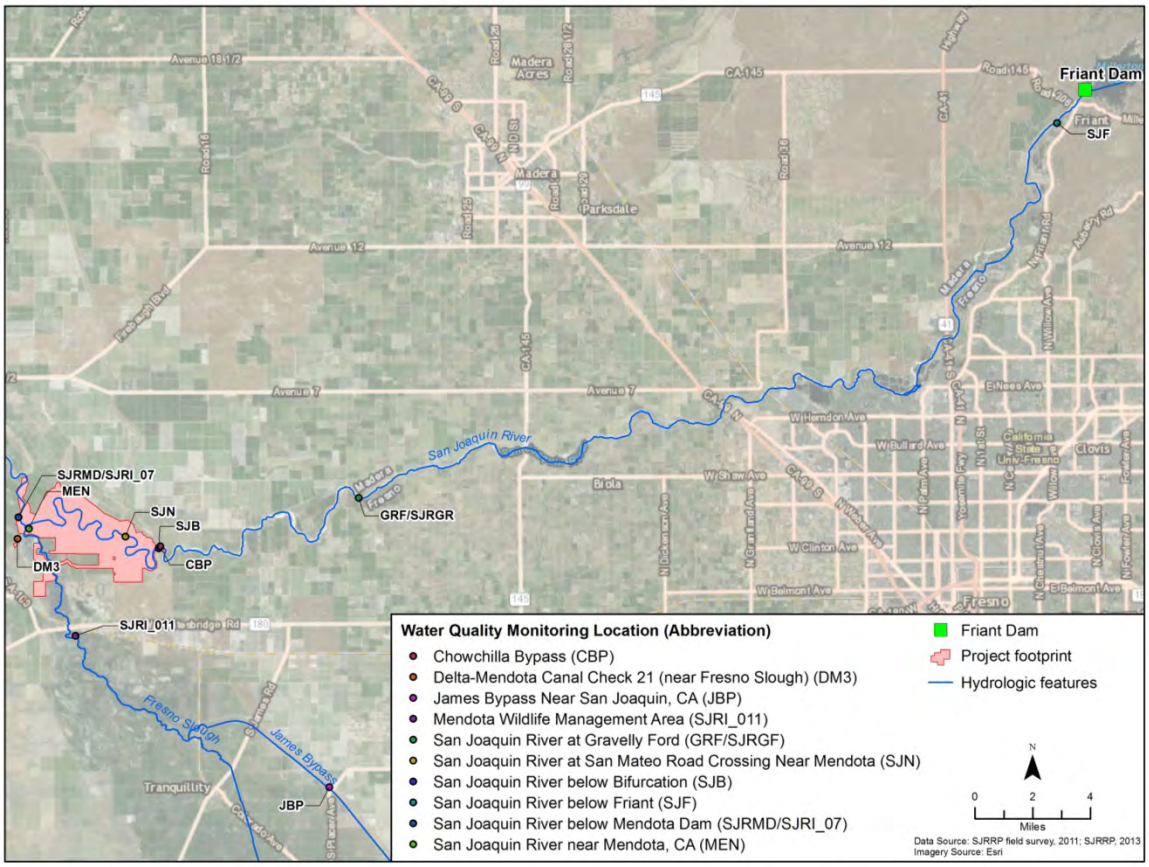


Figure 14-2.
Monitoring Locations

Seepage of river flows to shallow groundwater is generally considered detrimental to agricultural lands due to the potential for waterlogging crops, root-zone salinization, and levee instability (SJRRP 2011c). Seepage in Reach 2B has been observed at flows above 1,300 cfs when the Mendota Dam flashboards are in place (San Joaquin River Resources Management Coalition 2007). Seepage in Reach 2B caused by high flows can be reduced by removal of the flashboards and by opening the sluice gates at Mendota Dam. These sluice gates and flashboards can be manually opened or removed in advance of high-flow conditions. This process lowers the water level in the pool during high flow events to reduce seepage impacts to adjacent lands, but hinders distribution of flows into the irrigation canals. Additional information on the seepage issue and interaction between surface and groundwater is provided in Chapter 13.0, "Hydrology-Groundwater."

Chowchilla Bypass

The Chowchilla Bypass extends from the Chowchilla Bifurcation Structure to the Eastside Bypass at the confluence of Fresno River. The design channel capacity of the bypass near the San Joaquin River is 5,500 cfs. The bypass is an unlined channel constructed in highly permeable soils, and much of the initial flood flows infiltrate and recharge groundwater (U.S. Department of the Interior, Bureau of Reclamation [Reclamation] and California Department of Water Resources [DWR] 2005).

Mendota Pool

Mendota Dam was constructed in 1917 at RM 204.8. Mendota Pool is the reservoir created by Mendota Dam and has both a San Joaquin River arm and a Fresno Slough arm. The San Joaquin arm of Mendota Pool extends to the San Mateo Avenue crossing. The Fresno Slough arm of Mendota Pool extends several miles south of the Project area. The pool serves as a distribution point for irrigation water supplies delivered by the Delta-Mendota Canal (DMC) and for refuge water supply to the Mendota Wildlife Area. It has a capacity of 8 TAF, a surface area of approximately 2,000 acres when full, and varies in width from less than 100 to several hundred feet (SJRRP 2011d). During the summer irrigation season, the water-surface elevation in the pool is maintained at a depth of approximately 18 feet in the immediate vicinity of the dam, and water elevations generally fluctuate less than 6 inches. Upstream channel depths are typically only about 4 feet, generally decreasing in the upstream direction.

Mendota Pool provides no long-term storage for water supply operations or flood management. Mendota Pool is primarily filled by the DMC, which has a design capacity of 4,600 cfs but typically conveys 2,500 to 3,000 cfs from the Sacramento-San Joaquin Delta during the irrigation season. When the DMC is not in operation, flow at Mendota Dam can fall to zero. Mendota Pool is not intended for flood control; flashboards on the dam are removed prior to high-flow events. During spring flood events, average monthly flow at Mendota Dam can reach 2,600 cfs.

Mendota Pool delivers water to the San Joaquin River Exchange Contractors Water Authority, other Central Valley Project contractors, wildlife refuges and management areas, and State water contractors. Water delivered to Mendota Pool from the DMC is withdrawn at seven canal or pump locations in the pool, leaving about 500 cfs to be discharged down the San Joaquin River for delivery to the Arroyo Canal, which is located about 23 miles downstream from Mendota Dam (SJRRP 2011b, pages 11-9 and 13-22).

Fresno Slough/James Bypass

Fresno Slough is a distributary of the North Fork of the Kings River and is an intermittent stream that flows northwesterly to the Project area. James Bypass is a constructed channel that bypasses a portion of Fresno Slough. Flows in the North Fork of the Kings River consist primarily of flood releases from Pine Flat Dam located about 55 miles to the east. Under current operational requirements, Kings River flood flows can enter Mendota Pool via Fresno Slough/James Bypass. Flows from the Kings River are regulated by Pine Flat Dam releases and the Crescent Weir, which are operated by the Kings River Conservation District. Pine Flat Dam has routed surplus flows through Fresno Slough/James Bypass in 20 of 53 years of operation (U.S. Environmental Protection Agency [EPA] 2007). Reclamation supplements natural flow from Fresno Slough/James Bypass and San Joaquin River into Mendota Pool with deliveries from the DMC to satisfy water supply contracts.

Interim Flows Program

The Interim Flows program began at the start of water year[1] 2010 and involves the release of 350 to 1,660 cfs from Friant Dam with a maximum flow of 1,300 cfs at the upstream end of Reach 2B in spring. These experimental flows have provided valuable information regarding temperatures, fish needs, seepage losses, shallow groundwater conditions, recirculation, recapture and reuse conditions, channel capacity, and levee stability. Restoration Flows were released starting on January 1, 2014. Restoration Flows are limited to the existing conveyance capacity of the reach.

Water Rights

Reclamation holds most of the water rights on the San Joaquin River, allowing diversion of water at Friant Dam pursuant to water rights permits and license. In order to facilitate exercise of these rights, purchase and exchange agreements have been executed involving water rights existing at the time the Central Valley Project was developed. The Exchange Contract provides for an annual delivery of approximately 850 TAF of water, subject to shortage provisions, to water right holders along the San Joaquin River in exchange for not exercising rights to divert from the San Joaquin River. This exchange is met with Delta deliveries from the DMC. If sufficient water from the DMC were not available for the exchange, Reclamation would need to make flows available from the San Joaquin River. With the exception of flood flows and releases made in compliance with Public Law 111-11, water passing Friant Dam is limited to that necessary to maintain the 5 cfs flow requirement at Gravelly Ford pursuant to various Holding Contracts.

14.1.3 Geomorphology

The San Joaquin River in Reach 2B is characterized by a single-thread, meandering, sand-bed channel that is bounded by local levees and a relatively flat overbank surface (Figure 14-3). The approximately 11.2-mile reach has a sinuosity[2] of about 2.2, the highest of any portion of the overall Restoration Area (Figure 14-4). The high sinuosity results from a combination of natural and man-induced factors. Geologically driven subsidence of the San Joaquin Valley, primarily downstream from Mendota Dam, is ongoing at a rate of about 0.25 millimeters (0.01 inch) per year (Ouchi 1983), and this rate accelerated significantly beginning in the 1920s due to human-induced subsidence associated with groundwater withdrawal and hydrocompaction of the soils by irrigation (Poland et al. 1975, Bull 1964, Sneed et al. 2013). (Subsidence is discussed further in Chapter 11.0, "Geology and Soils" and Chapter 13.0, "Hydrology – Groundwater.") The general alignment of the river down the dip slope of the subsiding basin causes the valley floor in Reach 2B to be steeper than in the up- and downstream reaches (Figure 14-5). The high sinuosity represents the historic adjustment of the river slope to achieve sediment-transport balance with the upstream sediment supply through lengthening of the channel.

[1] Most hydrologic monitoring occurs for a period defined as a water year, which begins on October 1 and ends on September 30 of the named year. For example, water year 2010 began on October 1, 2009 and concluded on September 30, 2010.

[2] Sinuosity is defined as the ratio of length along the river to the approximate straight-line distance down the valley.

Comparison of the river maps prepared by the California Debris Commission in 1914 with current aerial photography and mapping indicates that there has been very little change in the channel alignment since at least the early 20th century (Figure 14-3 [bottom]), even though the river continued to see relatively high flows on a regular basis until completion of Friant Dam in the 1940s (Figure 14-6). Although the scale and resolution do not permit direct comparison with the current river alignment, mapping from the mid-1800s by the General Land Office and the 1880s by William Hammond Hall indicate that this reach had a meandering planform similar to the existing planform even at that time.

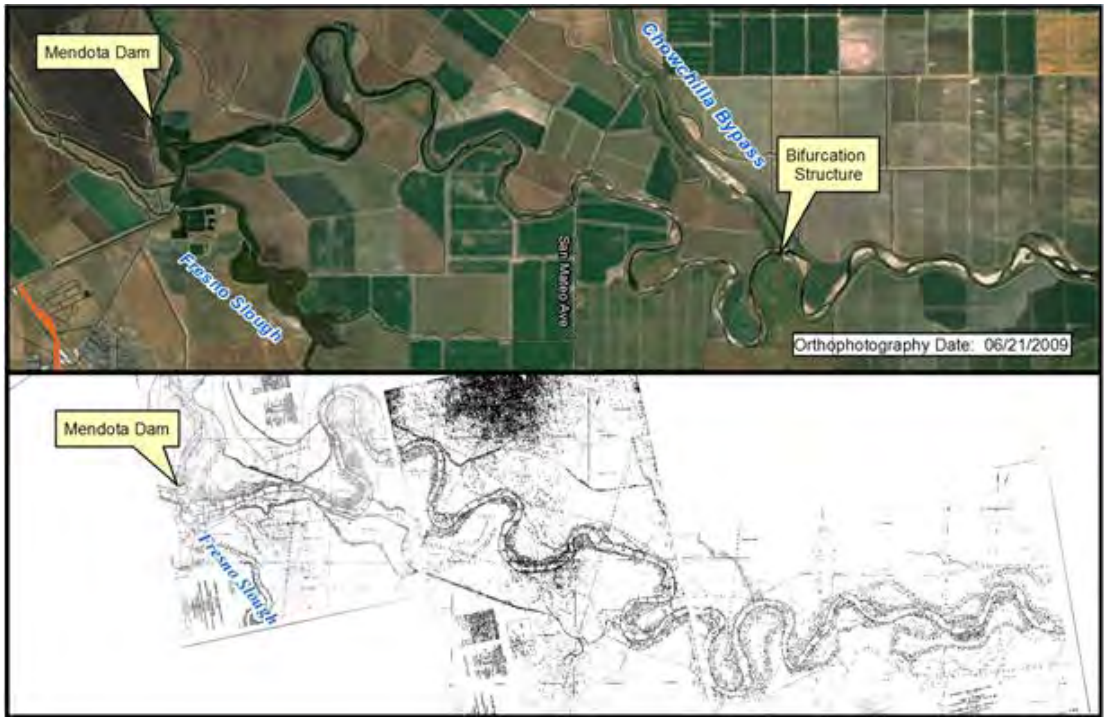


Figure 14-3.
Aerial Photograph from 2009 (Top) and California Debris Commission Mapping from 1914 (Bottom) of Reach 2B

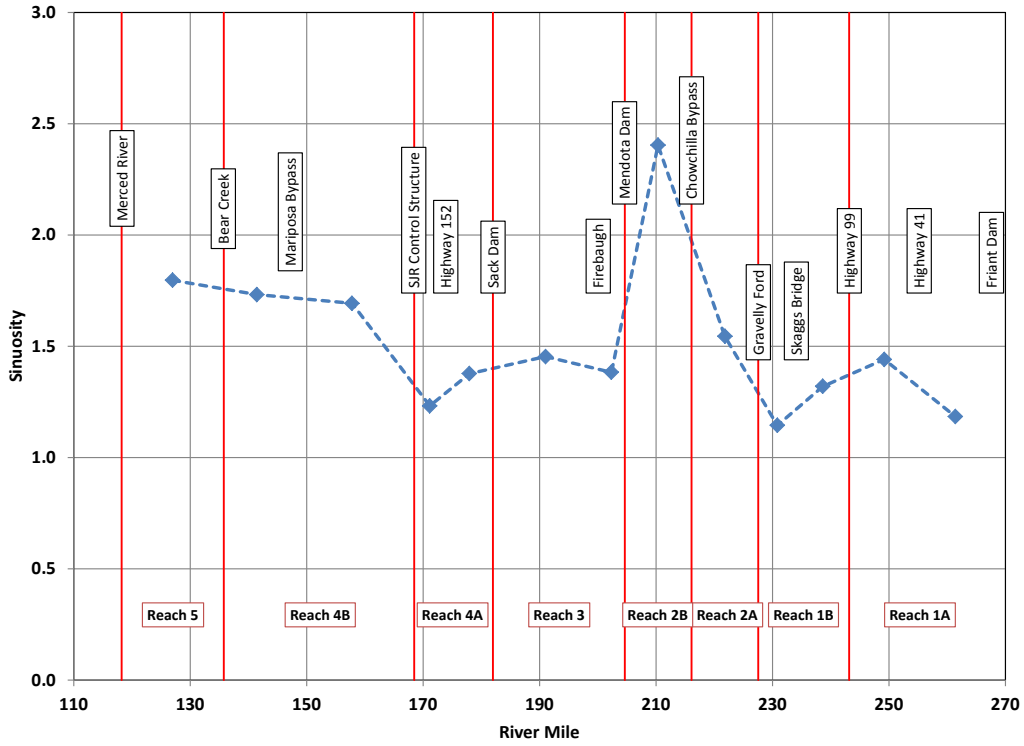


Figure 14-4.
Sinuosity of the San Joaquin River between Friant Dam and the Merced River

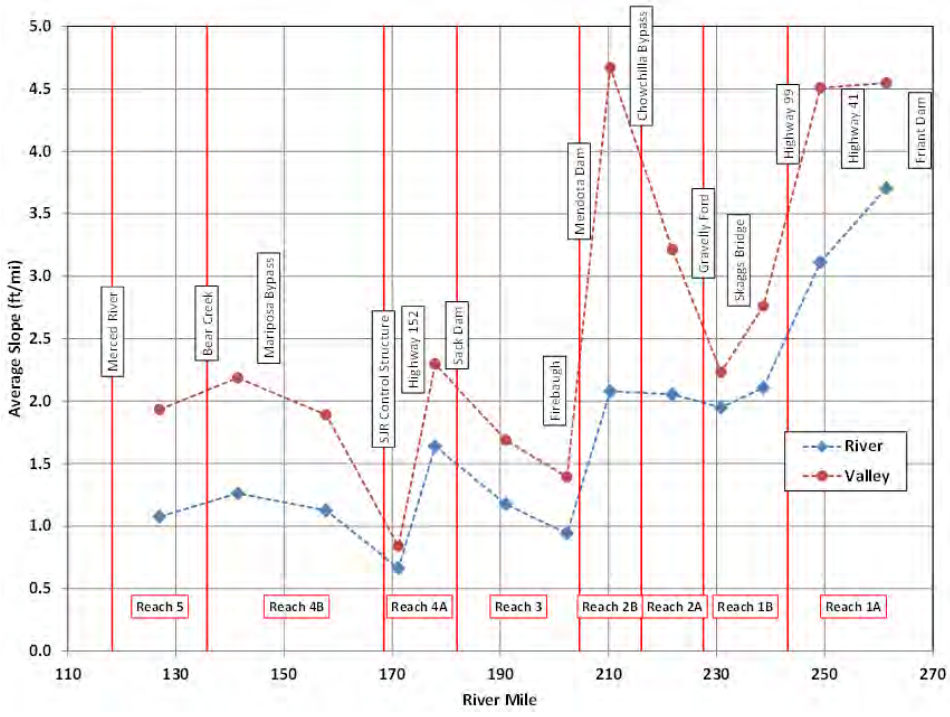
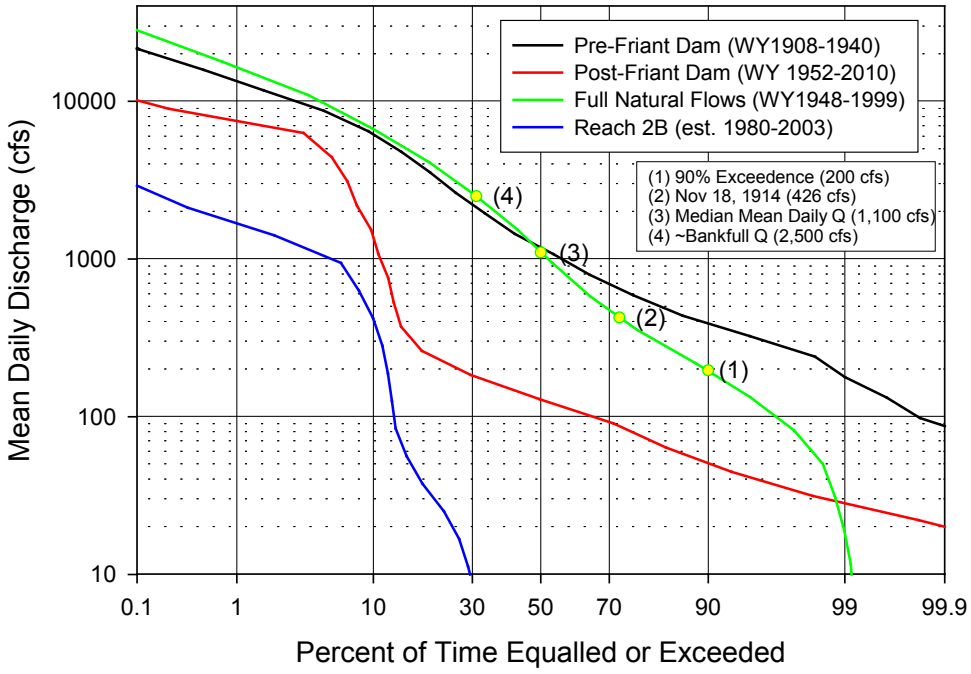


Figure 14-5.
Average Slope of the San Joaquin Valley and River between Friant Dam and the Merced River



Note: Also shown is the estimated flow-duration curve in Reach 2B for a portion of the post-Friant Dam period.

Figure 14-6.
Mean Daily Flow Duration Curves at the Friant Gage under Full Natural Flow, Pre-Friant Dam and Post-Friant Dam Conditions

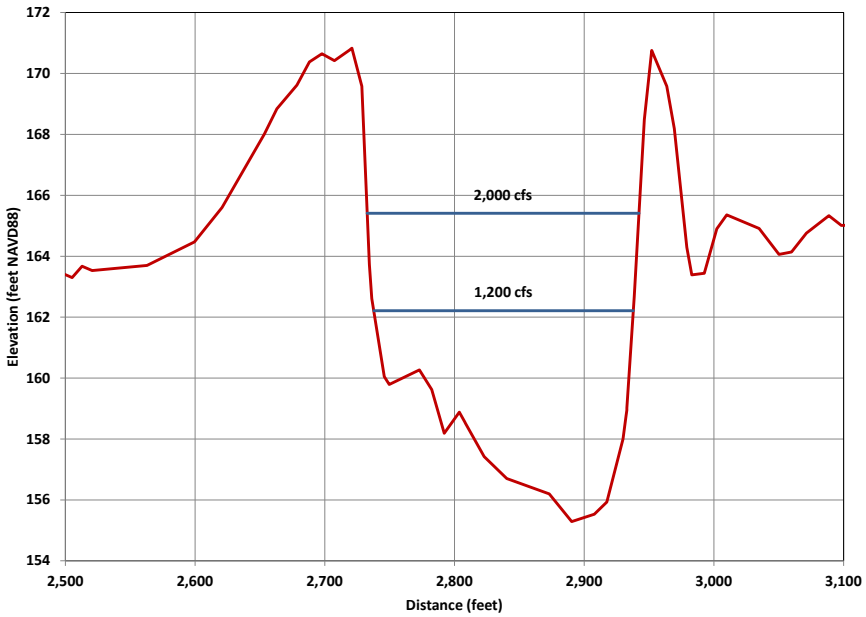
The main channel in Reach 2B typically has a wide, relatively shallow cross-section shape, with bed material that is generally in the medium- to coarse-sand size range (Figures 14-7 and 14-8). Channel widths in the portions of the reach outside the backwater effects of Mendota Dam are in the range of 200 to 400 feet, and average about 250 feet (Figure 14-9). Based on one-dimensional hydraulic modeling using the 2009 LiDAR (Light Detection and Ranging) data, typical cross-sectionally averaged flow depths at discharges in the range of the restoration releases vary from 2.5 to 7 feet, averaging 4 feet at 1,250 cfs and about 6 feet at 2,000 cfs (Figure 14-10).[3] The hydraulic model results also indicate that the bankfull capacity (based on the ground overbank elevations outside the local levees)[4] is about 1,600 cfs in the downstream portion of the reach between San Mateo Avenue and the head of Mendota Pool and about 2,100 cfs in the upstream portion of the reach between San Mateo Avenue and the Chowchilla Bifurcation Structure (Figure 14-11).

The lower capacity downstream from San Mateo Avenue is caused by a combination of sediment deposition and areas of relatively thick instream and riparian vegetation both associated with backwater effects from Mendota Dam (Figures 14-12 and 14-13). San Mateo Avenue is currently a low-water crossing with an approximately 5-foot-diameter culvert through the embankment that begins to overtop at less than 320 cfs. This crossing

[3] Note that the depth varies outside this range in local areas.
[4] The bankfull capacity occurs where the stream completely fills its channel at maximum capacity.

provides grade control and has a limited effect on the upstream water-surface profile and associated hydraulic conditions.

Figure 14-7.
View Looking Upstream of the San Joaquin River near the Apex of the Bend about River Mile 213.3, Downstream from the Chowchilla Bypass



Note: Also shown are the modeled water-surface elevations at 1,200 and 2,000 cfs based on 2009 LiDAR topography.

Figure 14-8.
Main Channel Cross Section Profile in the Vicinity of River Mile 213.3 (Downstream View)

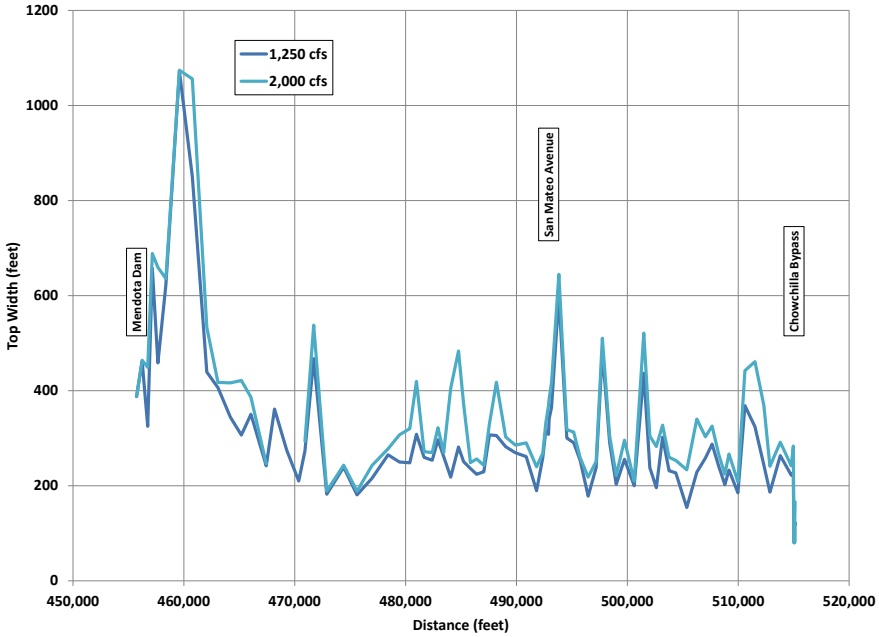


Figure 14-9.
Modeled Top Widths along Reach 2B at Discharges of 1,200 and 2,000 cfs based on 2009 LiDAR Topography

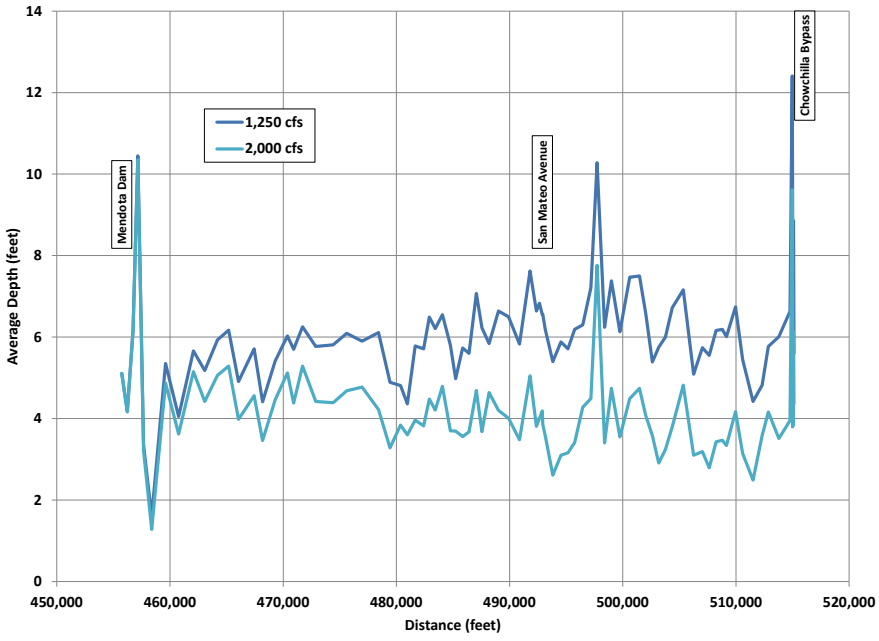


Figure 14-10.
Modeled Cross-Sectionally-Averaged Flow Depths along Reach 2B at Discharges of 1,200 and 2,000 cfs based on 2009 LiDAR Topography

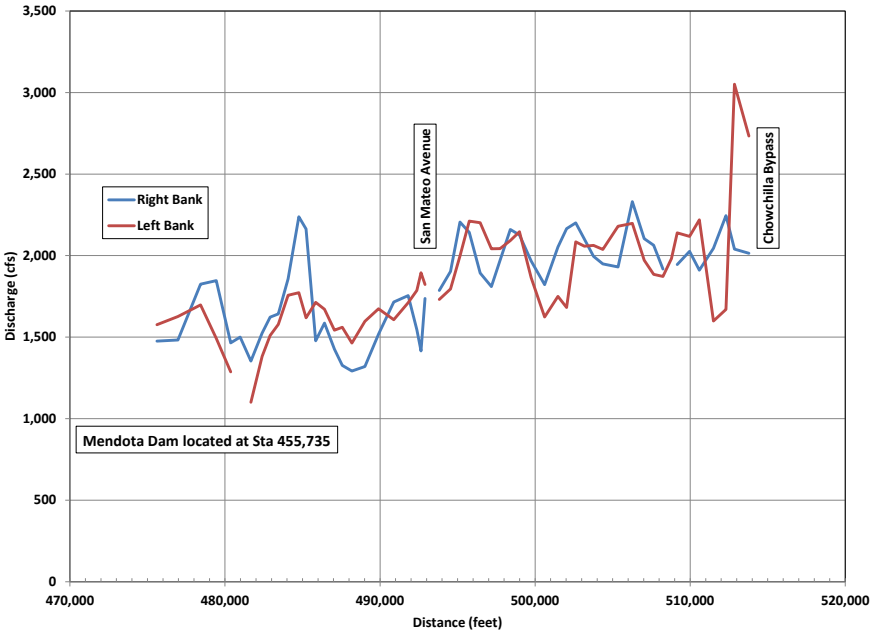
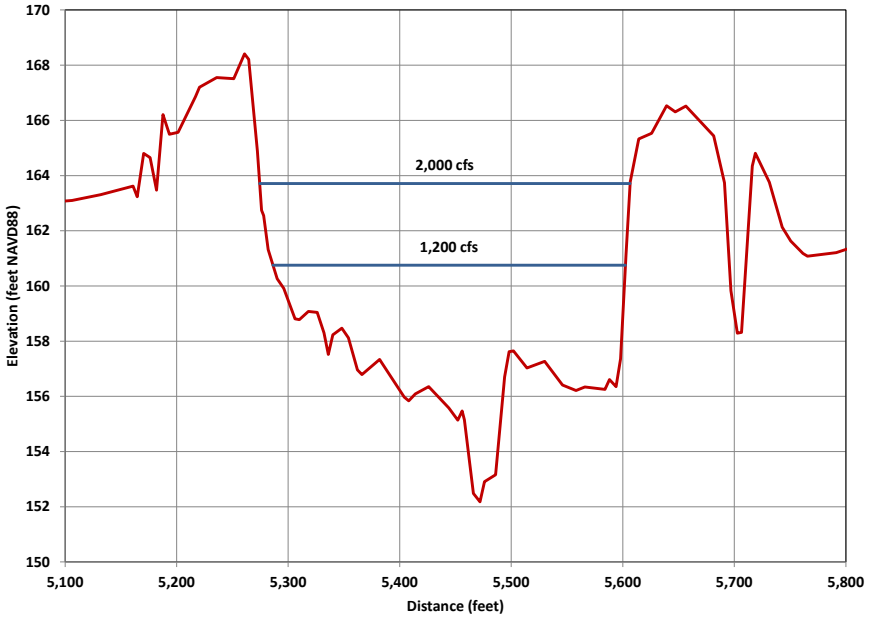


Figure 14-11.
Existing Bankfull Discharge in the Portions of Reach 2B Upstream from the Normal Backwater Effect of Mendota Dam based on the Ground Elevations Outside the Interior Levees

Note: Outlet of the ~5-foot diameter culvert is visible in the bottom-center of the photo and upstream edge of thick in-channel vegetation is visible in the background.

Figure 14-12.
View Looking Downstream from San Mateo Avenue



Note: Also shown are the modeled water-surface elevations at 1,200 and 2,000 cfs based on 2009 LiDAR topography.

Figure 14-13.
Main Channel Cross Section Profile about 500 feet Downstream from San Mateo Avenue, in the Area Shown in Figure 12 (Downstream View)

Based on hydraulic modeling using the topography from the 1914 California Debris Commission mapping, the in-channel capacity was about 2,500 cfs, 20 to 30 percent higher than the existing capacity. Although a significant amount of the sediment carried by the river from upstream has been diverted into the Chowchilla Bypass since construction of the flood-control system in the 1960s (as evidenced by the approximately 200,000 cubic yard sediment trap in the Chowchilla Bypass just downstream of the Chowchilla Bifurcation Structure [Figure 14-14]), sediment-continuity analysis by Tetra Tech (2011) and sediment-transport modeling by Reclamation (2011) indicate that Reach 2B is slightly aggradational[5] under existing conditions. This aggradation, coupled with the thick in-channel vegetation downstream from San Mateo Avenue, is the likely cause of the decrease in channel capacity over the past century.

[5] The streambed is being elevated slightly due to sediment deposition.

Figure 14-14.
View of 200,000 Cubic Yard Sediment Trap in the Chowchilla Bypass just Downstream from the Chowchilla Bifurcation Structure

The geomorphic literature indicates that the bankfull capacity in self-adjusted channels is typically in the range of the mean annual (i.e., 1.5- to 2-year) flood peak, although this can vary widely from less than the 1.5-year up to the 5-year or higher flood peak, depending on local conditions (Williams 1978, Wolman and Miller 1960). The 2-year flood peak under unregulated conditions was approximately 11,000 cfs (U.S. Army Corps of Engineers [Corps] and DWR 2002), and the discharge at the Friant gage, located about 50 miles upstream from the head of Reach 2B,[6] exceeded 2,500 cfs about 30 percent of the time (or about 110 days per year, on average) prior to significant water-resources development in the basin (Corps and DWR 2002) (see Figure 14-6). The duration of flows above 2,500 cfs decreased only slightly, to about 100 days per year during the early part of the 20th century, as water-resources development continued to occur prior to construction of Friant Dam. The overbanks were, thus, inundated for extended periods of time essentially every year, with flow passing from the main channel into a series of distributary channels, including Lone Willow Slough in the vicinity of the Chowchilla Bifurcation Structure. The locations of these distributary channels in the San Joaquin River floodplain can be clearly seen in the detailed National Resources Conservation Service (NRCS) (1990 and 2006) soils mapping, particularly on the north side of the river (see Hydrologic Soils Group [HSG] A soils in Figure 14-15).

[6] Although flow losses of up to 250 cfs occur in the 50-mile reach, these losses are less significant at higher flows; thus, the high flow data from the Friant gage are reasonably representative of flows reaching the head of Reach 2B.

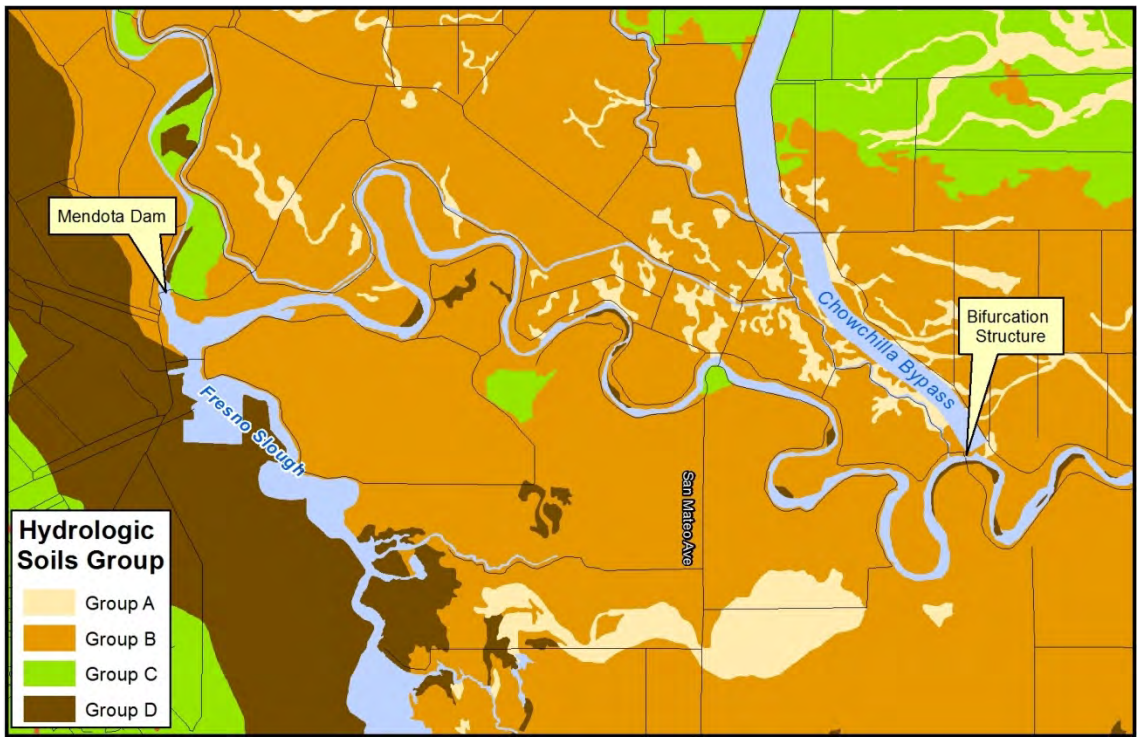


Figure 14-15.
Hydrologic Soil Groups in Floodplain of Reach 2B

According to Ouchi (1983), the reach from about Gravelly Ford downstream through Reach 2B is the modern-day alluvial fan of the San Joaquin River which explains the presence of the distributary channels and low main channel capacity. The cross-valley profile near the head of Reach 2B, in which the topography generally slopes downward away from the river, is consistent with the anticipated profile of a valley-floor fan, corroborating the conclusions of Ouchi (1983) (Figure 14-16).

Most of the floodplain soils along Reach 2B outside the overflow channels are categorized as HSG B, which means that they are typically composed of loamy sand or sandy loam with 10- to 20-percent clay and 50- to 90-percent sand. These soils have moderately low runoff potential when wet and are moderately susceptible to erosion. The HSG A soils tend to contain a greater percentage of sand, reflecting the higher flow energy in the overflow channels, compared to the floodplain areas outside these channels. These soils provide excellent growth media for riparian vegetation where they are exposed in the river banks which accounts for the limited amount of bank erosion and channel migration that has occurred since the mid- to late-1800s. The presence of the HSG A soils suggest that the overbank soils that would be the foundation for any future levees along the reach are highly variable, a factor that will be very important in designing the levee foundations.

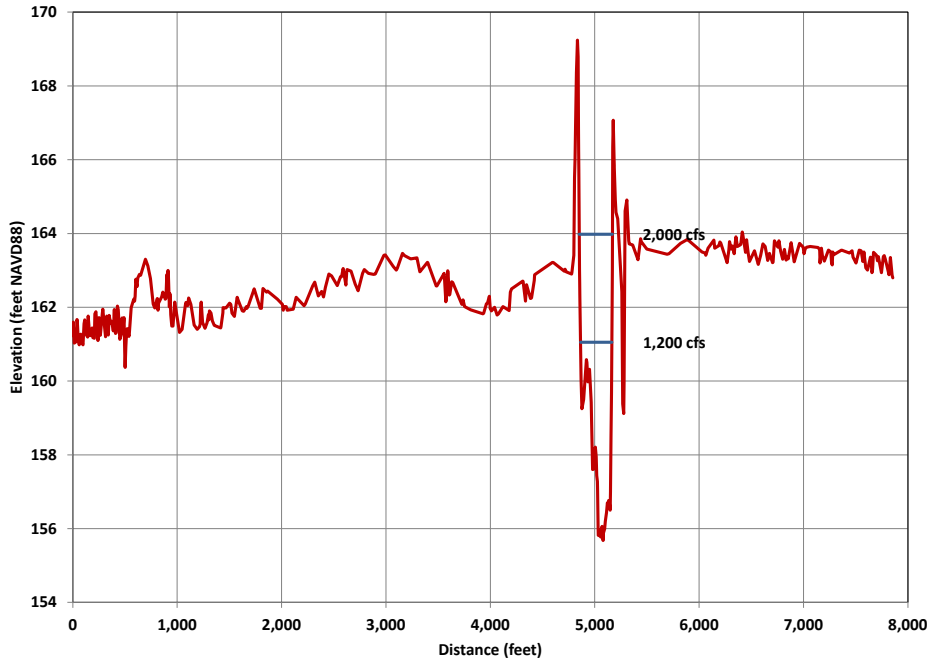


Figure 14-16.
Typical Cross Section Profile of San Joaquin River and Overbanks about River Mile 212.1, Downstream from the Chowchilla Bifurcation Structure

14.1.4 Water Quality

The primary source of water at the upstream end of Reach 2B (i.e., releases from Friant Dam) is generally considered very good in terms of water quality, having low temperature, low salinity, high dissolved oxygen, low nutrient concentrations, and no known problems with trace elements or pesticides (McBain and Trush, Inc. 2002). However, surface water quality in the Project area can be degraded due to low river flows, agricultural operations, and illegal dumping, resulting in increased concentrations of salts, pesticides, nutrients (from fertilizers), and trash and debris. Percolating rainfall and excess irrigation water leach these constituents downwards from fields into the shallow aquifer; the shallow aquifer has a hydrologic connection to local ditches, canals and the river. Stormwater runoff and agricultural return flows mobilize the same set of contaminants from fields into local receiving waters. Deliveries of Sacramento-San Joaquin Delta water to Mendota Pool via the DMC also affect water quality in the lower part of the Project area. In addition, abandoned mill and mine sites in the New Idria mining area of San Benito County within the Kings River/Fresno Slough watershed may contribute mercury and arsenic to Mendota Pool.

Table 14-4 lists general water quality indicator data for several stations in the vicinity of Reach 2B. Electrical conductivity (EC), expressed in microsiemens per centimeter (µS/cm), is used as a proxy for salinity since EC concentrations increase with increasing salt concentrations and EC is generally proportional to salinity. Stations on the San Joaquin River at Gravelly Ford (above Reach 2B) and below the Chowchilla Bifurcation

(at the upstream end of Reach 2B) (i.e., stations GRF and SJB) are distinguished from lower stations by their relatively low EC with average concentrations of 44 µS/cm and 45 µS/cm respectively. The DMC (station DM3), with an average EC concentration of 510 µS/cm, is the primary source of water for the Mendota Pool. The impact of DMC imports on San Joaquin River water quality is evident at the San Joaquin River station near Mendota where average EC concentrations were 465 µS/cm (from April 1951 to September 1984) and 329 µS/cm (from November 2009 to September 2011). A similar pattern between upstream and downstream stations is seen with pH data (but not turbidity); however, pH and turbidity measurements were not reported for DM3.

A more extensive suite of constituents (including total suspended solids, nutrients, total and dissolved organic carbon, bacteria, and trace elements) have been monitored monthly by the Interim Flows program beginning October 2009. The program targets several stations along the San Joaquin River including San Joaquin River at Gravelly Ford and San Joaquin River below Mendota Dam (SJRRP 2013). Average concentrations of select parameters are listed for these stations in Table 14-5. In general, concentrations of total suspended solids, nutrients, boron, chromium, copper, mercury, nickel, selenium, and zinc are higher at the downstream station (below Mendota Dam) compared to the upstream station (Gravelly Ford).

The Interim Flows program also sampled for a large suite of pesticides (organochlorine, pyrethroids, carbamates, organophosphates) on April 6, 2011. The only pesticide that exceeded detection limits was alpha-hexachlorocyclohexane (alpha-HCH), an organochlorine pesticide which was measured at San Joaquin River below Mendota Dam at a concentration of 0.002 micrograms per liter (µg/L). The compound alpha-HCH is a byproduct of the production of the insecticide lindane. There are no aquatic life water quality objectives for alpha-HCH; however, the California Toxics Rule (CTR) drinking water criteria for the protection of human health (30-day average) is 0.0039 µg/L.

Table 14-4.
General Water Quality Indicators at Stations in the Vicinity of Reach 2B, San Joaquin River

Water Quality Parameter	Metric	RWQCB Water Quality Objective[1]	San Joaquin River at Gravelly Ford (GRF)[2]	San Joaquin River below Bifurcation (SJB)[2]	Delta-Mendota Canal Check 21 (DM3)[2]	San Joaquin River near Mendota (MEN)[3]	San Joaquin River near Mendota (SJRI_07)[4]	Mendota Wildlife Management Area (SJRI_011)[4]
Temperature (°F)	Average	--	63.5	66	64.3	--	65	68
	Range	--	39.7 - 87.8	47.4 - 86.2	45 - 80.8	--	49.6 - 80.1	60.1 - 79.9
	Period of Record	--	7/2/04 to 10/7/2011	11/16/09 to 10/7/2011	2/26/99 to 10/7/2011	no data	11/17/09 - 9/13/11	3/8/11 to 9/13/11
Electrical Conductivity (µS/cm)	Average	--	44	45	510	465	329	217
	Range	--	20 - 131	22 - 112	158 - 1256	31 - 1260	37 - 673	36 - 558
	Period of Record	--	7/2/04 to 10/7/2011	11/16/09 to 10/7/2011	3/26/99 to 10/7/2011	4/13/51 to 9/6/84	11/17/09 - 9/13/11	3/8/11 to 9/13/11
Turbidity (NTU)	Average	--	20	139	--	--	21	19.7
	Range	--	0 - 213	0.5 - 1206	--	--	4 - 41.5	14.3 - 27.2
	Period of Record	--	8/18/10 to 10/7/2011	11/16/09 to 10/7/2011	no data	no data	11/17/09 - 9/13/11	7/12/11 to 9/13/11
Dissolved Oxygen (mg/L)	Average	>7	10.2	-[5]	--	10	10.6	11
	Range	--	7.8 - 12.4	-[5]	--	7.8 - 11.7	6.1 - 18.6	7.3 - 18.6
	Period of Record	--	8/18/10 to 10/7/2011	11/16/09 to 10/7/2011	no data	11/14/79 to 9/10/80	3/3/10 - 9/13/11	3/8/11 to 9/13/11
pH (units)	Average	--	7	7.2	--	7.7	7.5	7.6
	Range	6.5 – 8.5	6.2 - 8.3	6.4 - 8.6	--	6.6 - 8.5	6.4 - 9.0	6.9 - 8.2
	Period of Record	--	8/18/10 to 10/7/2011	11/16/09 to 10/7/2011	no data	4/13/51 to 9/6/84	11/17/09 - 9/13/11	3/8/11 to 9/13/11

Source: DWR 2011, USGS 2011, SJRRP 2011a, RQWCB 2011

Notes:

[1] RWQCB 2011

[2] Data downloaded from California Data Exchange Center on October 7, 2011. Site location near Fresno Slough.

[3] Data downloaded from USGS National Water Information System for USGS station 11254000 on October 7, 2011.

[4] San Joaquin River Restoration Program Interim Flows Special Investigation Project.

[5] Data quality questionable.

Key:

ºF = degree Fahrenheit
µS/cm = microsiemen per centimeter
mg/L = miligrams per liter
NTU = nephelometric turbidity unit
RWQCB = Regional Water Quality Control Board
USGS = U.S. Geological Survey

Table 14-5.
Interim Flows Water Quality Data, San Joaquin River

Metric	Units	WQO	Upstream of Reach 2B[1]	Downstream of Reach 2B[2]
			Average[3]	Average[3]
Mean daily flow	cfs	--	845	838
Total Suspended Solids	mg/L	--	2.96	27.3
Nutrients				
Nitrate and Nitrite as N	mg/L	10	0.056	0.81
Nitrate as N	mg/L	10	0.034	0.59
Phosphorus, total as P	mg/L	--	0.069	0.28
Total Kjeldahl Nitrogen	mg/L	--	0.25	0.67
Total Organic Carbon	mg/L	--	3.2	3.1
Dissolved Organic Carbon	mg/L	--	3.2	3.2
Trace Elements, Total				
Arsenic	µg/L	10	1.60	1.79
Boron	µg/L	--	19.6	154
Chromium	µg/L	50	0.41	1.78
Copper	mg/L	1,300	1.08	3.0
Lead	µg/L	150	0.52	0.58
Mercury	ng/L	2,000	0.51	54.4
Molybdenum	µg/L	--	1.25	1.85
Nickel	µg/L	100	0.53	3.07
Selenium	µg/L	50	0.24	0.48
Sulfate	mg/L	--	1.43	39.6
Zinc	µg/L	5,000	2.91	5.90
Field Measurements				
pH	units	6.5-8.5	7.07	7.48
Conductivity	µS/cm	--	60.9	353
Turbidity	NTU	--	6.27	16.8
Dissolved Oxygen	mg/L	7	10.9	11.2
Temperature	°C	--	15.9	17.3

Source: SJRRP 2011a, RWQCB 2011

Notes:

[1] San Joaquin River at Gravelly Ford (Oct. 2009 - Jun. 2011)

[2] San Joaquin River below Mendota Dam (Oct. 2009 - Jun. 2011)

[3] Data reported as non-detect were treated as half the detection limit.

Key:

ºC = degree Celsius
µg/L = microgram per liter
µS/cm = microsiemen per centimeter
cfs = cubic feet per second
mg/L = miligrams per liter
NA = Not available
ng/L = nanograms per liter
NTU = nephelometric turbidity unit
RWQCB = Regional Water Quality Control Board
WQO = water quality objective

Sediment Quality

As part of the Interim Flows program, bed sediment samples collected at target stations in fall and winter 2009 and spring 2010 were analyzed for metals, trace elements, and toxicity. More comprehensive sediment sampling was conducted in fall/winter 2011 by the SJRRP to characterize sediments in Mendota Pool, many of which are expected to erode from the existing pool area as a result of Project alternatives which lower Mendota Dam (SJRRP 2011e, SJRRP 2012). A total of 13 volume-proportional composite samples were collected from drill holes advanced between Mendota Dam and 4.7 miles upstream in the San Joaquin river arm of Mendota Pool, including a background sample composited from sediment collected between approximately RM 206.5 and RM 209.5. Elutriate[7] was sampled to estimate the concentrations of chemicals that are likely to be released to the water column should Mendota Pool sediments become suspended or transported. Sediment and elutriate samples were analyzed for physical properties, "constituents of potential concern" (metals, pesticides, and organic compounds), and acute toxicity.

Analytical results from the 2009/2010 Interim Flows program and the 2011 SJRRP study were compared to several applicable sediment and water quality standards to identify chemicals that may be present at potentially harmful concentrations to freshwater aquatic life and human health (SJRRP 2012). Sediment concentrations of some constituents exceed one or more of the screening quick reference tables toxicity thresholds that predict "unlikely" adverse sediment impacts, including four metals (arsenic, chromium, copper, and nickel) and two organic pesticides (4,4'-dichlorodiphenyldichloroethane [DDD] and 4,4'-dichlorodiphenyldichloroethylene [DDE]). However, toxicity test results did not show significantly increased mortality of test organisms, and no chemical analytes were detected at concentrations exceeding Dredged Material Management Program Disposal Procedures Users' Manual bioaccumulation triggers; therefore, the SJRRP study concluded that sediment within Mendota Pool is not likely to have an adverse effect on the benthic community (SJRRP 2012).

Concentrations of several constituents in the elutriate exceeded water quality objectives from the Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Basin Plan) and CTR water quality standards. These include EC, ammonia as nitrogen, metals (aluminum, arsenic, barium, cadmium, copper, iron, lead, manganese, mercury, and molybdenum) and organic pesticides (4,4'-DDD, total DDD, 4,4'-DDE, and total DDE). In addition, toxicity tests on elutriate samples from lower- and middle-pool regions showed significant reductions in survival of test organisms. Based on these findings, the SJRRP study concluded that Mendota Pool sediment suspended in the water column could increase chemical concentrations to levels that violate promulgated Basin Plan objectives and CTR water quality standards (SJRRP 2012).

[7] Elutriate is formed by vigorously mixing one part sediment to four parts water, allowing the mixture to settle, and then centrifuging to remove particulates. The resulting fluid is termed "elutriate."

Beneficial Uses and Listed Waterbodies

The beneficial uses designated by the Central Valley Regional Water Quality Control Board (RWQCB) for the San Joaquin River between Friant Dam and the Mendota Pool include the following (RWQCB 2011):

- Municipal and domestic supply.
- Agriculture irrigation and stock watering.
- Industrial process supply.
- Contact and non-contact water recreation.
- Warm and cold freshwater habitat.
- Migration of aquatic organisms (warm and cold).
- Spawning, reproduction, and/or early development.
- Wildlife habitat.

No beneficial uses have been specifically designated for Fresno Slough. State policy, however, is that the beneficial uses for a specific water body generally apply to its tributaries.

San Joaquin River between Friant Dam and Mendota Pool is identified on the Clean Water Act (CWA) Section 303(d) list as impaired by invasive species with an unknown source. The Total Maximum Daily Load (TMDL) plan to correct the impairment is scheduled for completion in 2019. Mendota Pool is listed as impaired by mercury caused by resource extraction; TMDL completion is scheduled for 2021. Mendota Pool is also listed for selenium with agriculture, agricultural return flows, and groundwater withdrawal identified as potential sources; TMDL completion is scheduled for 2019. The reach of the San Joaquin River immediately downstream of Reach 2B, between the Mendota Pool and Bear Creek, is listed for boron, chlorpyrifos, dichlorodiphenyl-trichloroethane (DDT), diazinon, EC, Group A (restricted) pesticides, and unknown toxicity. Agriculture is identified as the potential source for all of these pollutants except unknown toxicity, for which the source is unknown. A TMDL for diazinon and chlopyrifos was approved by the EPA in December 2006.

14.2 Regulatory Setting

This section focuses on laws related directly to surface water and water quality. The majority of this discussion is taken directly from the Program Environmental Impact Statement/Report (PEIS/R) (SJRRP 2011b, pages 14-7 to 14-11). A number of regulatory authorities at the Federal, State, and local levels control the flow, quality and supply of water in California, either directly or indirectly. At the State level, the State Water Resources Control Board (SWRCB) and the Central Valley RWQCB regulate water quality in San Joaquin River. The EPA also plays an important role under the auspices of the Federal CWA and Safe Drinking Water Act. The California Department of Health

Services (DHS) has an interest in the Delta because the Delta is the source of drinking water for over 25 million Californians.

14.2.1 Federal

This section presents the applicable Federal regulations associated with surface water and water quality.

Safe Drinking Water Act

The Safe Drinking Water Act was established to protect the quality of drinking water in the United States. The Safe Drinking Water Act authorized EPA to set National health-based standards for drinking water, and requires many actions to protect drinking water and its sources, including rivers, lakes, reservoirs, springs, and groundwater wells. Furthermore, the Safe Drinking Water Act requires all owners or operators of public water systems to comply with primary (health-related) standards. EPA has delegated to the DHS, Division of Drinking Water and Environmental Management, the responsibility for administering California's drinking-water program.

Clean Water Act

The CWA is the primary Federal legislation governing the water quality aspects of the Project. The objective of the act is "to restore and maintain the chemical, physical, and biological integrity of the nation's waters." The CWA establishes the basic structure for regulating discharge of pollutants into the waters of the United States and gives EPA the authority to implement pollution control programs such as setting wastewater standards for industries. In certain states such as California, EPA has delegated authority to state agencies.

Section 303. Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. The three major components of water quality standards are designated users, water quality criteria, and antidegradation policy. Section 303(d) of the CWA requires states and authorized Native American tribes to develop a list of water-quality-impaired segments of waterways. The list includes waters that do not meet water quality standards necessary to support the beneficial uses of a waterway, even after point sources of pollution have installed the minimum required levels of pollution control technology. Only waters impaired by "pollutants" (including clean sediments, nutrients such as nitrogen and phosphorus, pathogens, acids/bases, temperature, metals, cyanide, and synthetic organic chemicals, not those impaired by other types of "pollution" (e.g., altered flow, channel modification), are to be included on the list.

Section 303(d). Section 303(d) of the CWA also requires states to maintain a list of impaired water bodies so that a TMDL can be established. A TMDL is a plan to restore the beneficial uses of a stream or to otherwise correct an impairment. It establishes the allowable pollutant loadings or other quantifiable parameters (e.g., pH, temperature) for a water body and thereby provides the basis for establishing water quality-based controls. The calculation for establishing TMDLs for each water body must include a margin of safety to ensure that the water body can be used for the purposes of State designation. Additionally, the calculation also must account for seasonal variation in water quality.

Central Valley RWQCB develops TMDLs for the San Joaquin River (see discussion on the Porter-Cologne Water Quality Control Act below).

Section 401. Section 401 of the CWA requires Federal agencies to obtain certification from the State or Native American tribes before issuing permits that would result in increased pollutant loads to a water body. The certification is issued only if such increased loads would not cause or contribute to exceedances of water quality standards.

Section 402. Section 402 of the CWA creates the National Pollutant Discharge Elimination System (NPDES) permit program. This program covers point sources of pollution discharging into a surface water body.

Section 404. A permit must be obtained from the Corps under Section 404 of the CWA for the discharge of dredged or fill material into "waters of the United States, including wetlands." Waters of the United States include wetlands and lakes, rivers, streams, and their tributaries. Wetlands are defined for regulatory purposes as areas inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support and, under normal circumstances do support, vegetation typically adapted for life in saturated soil conditions.

Antidegradation Policy

The Antidegradation Policy, established in 1968 and revised in 2005 (40 Code of Federal Regulations [CFR], Section 131.12), is designed to protect existing uses and water quality and National water resources, as authorized by Section 303(c) of the CWA. This policy protects water bodies where existing quality is higher than necessary for protection of beneficial uses. It states that high quality waters will be maintained unless a change in water quality is (1) consistent with maximum benefit to the people of the State, (2) will not unreasonably affect present and anticipated beneficial uses of the water, and (3) will not result in water quality less than that prescribed in policies.

Rivers and Harbors Act Section 10

Section 10 of the Rivers and Harbors Act (33 United States Code 401 et seq.) requires authorization from the Corps for construction of any structure over, in, or under navigable waters of the United States.

National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) is responsible for determining flood elevations and floodplain boundaries and distributing Flood Insurance Rate Maps, which are used in the National Flood Insurance Program. Flood Insurance Rate Maps identify the locations of special flood hazard areas, including the 100-year and 500-year floodplain. Federal regulations governing development in a Zone A (100-year) floodplain are set forth in 44 CFR, Part 60, which enables FEMA to require municipalities that participate in the National Flood Insurance Program to adopt certain flood hazard reduction standards for construction and development within floodplains. In the Project area and vicinity, the FEMA program is overseen by the Fresno County Department of Public Works and Planning Development Engineering Section and the Madera County Flood Control and Water Conservation District.

Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) was first passed in 1947 to establish labeling provisions and procedures for registering pesticides with the U.S. Department of Agriculture. It was rewritten in 1972 and has since been amended several times. In its current form, FIFRA mandates that EPA regulate the use and sale of pesticides to protect human health and preserve the environment. Registration with the EPA assures that pesticides would be properly labeled and that, if used in accordance with specifications, they would not cause unreasonable harm to the environment. Pesticide use in California is also regulated by the California Department of Pesticide Regulation (DPR) and local County Agricultural Commissioners.

14.2.2 State of California

This section presents the applicable State regulations associated with surface water quality.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act is California's statutory authority for protecting water quality. Under the act, the State must adopt water quality policies, plans, and objectives protecting the State's waters for the use and enjoyment of people. Obligations of SWRCB and the RWQCBs to adopt and periodically update their Water Quality Control Plans (e.g., Basin Plans) are set forth in the act. A Basin Plan identifies the designated beneficial uses for specific surface water and groundwater resources, applicable water quality objectives necessary to support the beneficial uses, and implementation programs that are established to maintain and protect water quality from degradation for each of the RWQCBs. The act also requires waste dischargers to notify the RWQCBs of their activities through filing reports of waste discharge, and authorizes SWRCB and the RWQCBs to issue and enforce waste discharge requirement, NPDES permits, Section 401 water quality certifications, or other approvals. The RWQCBs also have authority to issue waivers for waste discharge reports/waste discharge requirements for broad categories of "low threat" discharge activities that have minimal potential for adverse water quality effects when implemented according to prescribed terms and conditions.

Water quality objectives established in the Basin Plan for the Sacramento River and San Joaquin River Basins (RWQCB 2011) to protect the beneficial uses from the types of potential pollutants that could be generated by the Project are included in Table 14-6.

Table 14-6.
Basin Plan Water Quality Objectives to Protect Beneficial Uses

Parameter	Water Quality Objective
Dissolved Oxygen	5.0 mg/L minimum in waters designated WARM 7.0 mg/L minimum in waters designated COLD 7.0 mg/L minimum in waters designated SPWN The monthly median of the mean daily dissolved oxygen concentration shall not fall below 85 percent of saturation in the main water mass, and the 95 percentile concentration shall not fall below 75 percent saturation.
Salinity	Electrical conductivity shall not exceed 150 µS/cm from Friant Dam to Gravelly Ford.
Suspended Material and Settleable Material	Waters shall not contain substances or suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed: 1 NTU where natural turbidity is between 0 and 5 NTUs; 20 percent where natural turbidity is between 5 and 50 NTUs; 10 NTUs where natural turbidity is between 50 and 100 NTUs; or 10 percent where natural turbidity is greater than 100 NTUs.
pH	The pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters designated with COLD or WARM beneficial uses.
Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in visible film or coating on the surface of the water or on objects in the water, or that otherwise adversely affect beneficial uses.
Floating Material	Waters shall not contain floating material in amounts that cause nuisance or adversely affect beneficial uses.
Temperature	The natural receiving water temperature intrastate waters shall not be altered unless it can be demonstrated that such alteration in temperature does not adversely affect beneficial uses. At no time or place shall the temperature of COLD or WARM intrastate waters be increased more than 5ºF (2.8ºC) above natural receiving water temperature.
Toxicity	All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances. Compliance with this objective would be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, and biotoxicity tests of appropriate duration or other methods as specified by the RWQCB
Pesticides	No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. Below Mendota Dam, the following objectives apply and should not be exceeded more than once in a three year period. Chlorpyrifos: 0.025 µg/L (1-hour average), 0.015 µg/L (4-day average) Diazinon: 0.16 µg/L (1-hour average), 0.10 µg/L (4-day average)

Source: RWQCB 2011

Key:

ºC = degree Celsius
ºF = degree Fahrenheit
µg/L = microgram per liter
µS/cm = microsiemen per centimeter
mg/L = miligrams per liter
NTU = nephelometric turbidity unit
RWQCB = Regional Water Quality Control Board

California Toxics Rule

On May 18, 2000, the EPA published the CTR in the Federal Register, adding Section 131.38 to 40 CFR and establishing new water quality objectives for some constituents in the Basin Plans. On May 22, 2000, the Office of Administrative Law approved, with modifications, the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Phase 1 of the Inland Surface Waters Plan and Enclosed Bays and Estuaries Plan). The Policy establishes implementation procedures for three categories of priority pollutant criteria or water quality objectives. These are:

- Criteria promulgated by the EPA in the National Toxics Rule that apply in California.
- Criteria proposed by the EPA in the CTR.
- Water quality objectives contained in RWQCB Basin Plans.

NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities

Construction activities on 1 acre or more are subject to the permitting requirements of the *NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities* (Construction General Permit) Order No. 2009-0009-DWQ, NPDES No. CAS000002 (SWRCB 2009). The SWRCB established the Construction General Permit program to regulate stormwater discharges from construction sites. The Construction General Permit implements a risk-based permitting approach, specifies minimum best management practice (BMP) requirements, and requires monitoring and reporting activities. The Construction General Permit establishes three project risk levels that are based on site erosion and receiving-water risk factors. Risk Levels 1, 2, and 3 correspond to low-, medium-, and high-risk levels for a project. A preliminary analysis indicates that the Project is likely to be categorized as either Risk Level 2 or 3 depending on the construction schedule.

The Construction General Permit requires preparation and implementation of a stormwater pollution prevention plan (SWPPP), which would provide BMPs to minimize potential short-term increases in transport of sediment and other pollutants caused by construction. Typical BMPs include:

- Implementing practices to minimize the contact of construction materials, equipment, and maintenance supplies with stormwater.
- Limiting fueling and other activities using hazardous materials to designated areas, providing drip pans under equipment, and daily checks for vehicle condition.
- Implementing practices to reduce erosion of exposed soil, including stabilization for soil stockpiles, watering for dust control, perimeter silt fences, and/or placement of fiber rolls.
- Implementing practices to maintain water quality including silt fences, stabilized construction entrances, and storm drain inlet protection.

- Implementing practices to capture and provide proper offsite disposal of concrete washwater, including isolation of runoff from fresh concrete during curing to prevent it from reaching the local drainage system.
- Developing spill prevention and emergency response plans to handle potential fuel or other spills.
- Where feasible, limiting construction to dry periods.

Waste Discharge Requirements for Dewatering and Other Low Threat Discharges to Surface Waters

The General Order for *Dewatering and Other Low Threat Discharges to Surface Waters*, RWQCB Order No. R5-2008-0081, is a general permit covering discharges of construction dewatering under the following circumstances: the discharge does "not contain significant quantities of pollutants and they are either (1) four months or less in duration, or (2) the average dry weather discharge does not exceed 0.25 million gallons per day."

California Water Code (Water Rights)

A water right is a legally protected right, granted by law, to take control of water and to put it to beneficial use. Under the California Water Code, the SWRCB is responsible for allocating surface water rights and permitting the diversion and use of water throughout the State. Through its Division of Water Rights, the SWRCB issues permits to store and to divert water for new appropriations and it authorizes changes to existing water rights. SWRCB attaches conditions to these permits to ensure that the water user prevents waste, conserves water, does not infringe on the rights of others, and puts the State's water resources to the most beneficial use.

An applicant, permittee, or licensee who wishes to change the point of diversion, place of use, or purpose of use from that specified in an existing permit or license must petition SWRCB to amend a water right. When considering a petition for a water right amendment, SWRCB considers the same factors as those it considers when a water user applies for a new permit, such as waste prevention, water conservation, infringement on the rights of others, and public trust values.

California Pesticide Regulatory Program

The DPR regulates the sale and use of pesticides in California. DPR is responsible for reviewing the toxic effects of pesticide formulations and determining whether a pesticide is suitable for use in California through a registration process. Although DPR cannot require manufacturers to make changes in labels, it can refuse to register products in California unless manufacturers address unmitigated hazards by amending the pesticide label. Consequently, many pesticide labels that are already approved by EPA also contain California-specific requirements. Pesticide labels are legal requirements and include instructions telling users how to make sure the product is applied only to target pests including precautions the applicator should take to protect human health and the environment. For example, product labels may contain such measures as restrictions in certain land uses and weather (i.e., wind speed) parameters. DPR is also responsible for examining and licensing qualified applicators, aircraft pilots, pest control dealer

designated agents, and agricultural pest control advisers; and for certifying pesticide applicators who use or supervise the use of restricted pesticides.

14.2.3 Regional and Local

Irrigated Lands Regulatory Program

The Irrigated Lands Regulatory Program was initiated in 2003 to prevent agricultural runoff from impairing surface waters. Irrigated lands are lands where water is applied for producing crops, including row, field, and tree crops, as well as commercial nurseries, nursery stock production, managed wetlands, and rice production. Except where the Central Valley RWQCB has adopted geographically-based or commonly based waste discharge requirements, irrigated agriculture lands enrolled in a coalition group are subject to a conditional waiver.

New waste discharge requirements are being developed under the Long-term Irrigated Lands Regulatory Program that address irrigated agricultural discharges throughout the Central Valley. The Central Valley RWQCB adopted Order No. R5-2012-0116 for the Eastern San Joaquin River Watershed and developed draft requirements for the Western San Joaquin River Watershed as part of the Long-term Irrigated Lands Regulatory Program.

Pesticide Use Permits

In addition to Federal and State oversight, County Agricultural Commissioners in California also regulate the sale and use of pesticides and issue use permits for applications of pesticides that are deemed as restricted materials by DPR. County Agricultural Commissioners also collect pesticide use reports and investigate incidents and illnesses.

Fresno County General Plan

The Fresno County General Plan (2000) contains numerous policies to protect and enhance the surface water and groundwater resources in the county. Policies OS-A.1 through OS-A.30 address broad water planning issues, groundwater recharge, the relationship of land use decisions to water issues, and water quality problems. Policies PF-E.1 through PF-E.22 seek to provide efficient, cost-effective, and environmentally-sound storm drainage and flood control facilities that protect both life and property and to divert and retain stormwater runoff for groundwater replenishment.

Fresno County Grading Ordinance

The Fresno County Code includes a grading ordinance that sets forth regulations for control of excavating, grading, earthwork construction, including fills or embankments and related work.

Madera County General Plan

The Madera County General Plan (adopted October 24, 1995) also contains policies related to water resources. These policies address protection of percolation and ground-water recharge, control of sedimentation and excessive grading, avoidance of flood hazards, use of construction BMPs, and storm drainage and flood control (reference, for

example: Policies 5.C.1 through 5.C.4, 5.C.7; Policies 3.E.1 through 3.E.6; and Policies 6.B.1 through 6.B.6).

Madera County Grading and Erosion Control

The Madera County Code includes a chapter on grading and erosion control that sets forth regulations for control of erosion, sedimentation, and other environmental damage resulting from excavations and related activities.

14.3 Environmental Consequences and Mitigation Measures

14.3.1 Impact Assessment Methodology

This section describes the approach for the analysis of surface water resources in the Project area, including geomorphology and water quality. Potential impacts to surface water diversions are evaluated and discussed in Chapter 23.0, "Utilities and Service Systems."

Geomorphology

The specific aspects of the Project that could affect the geomorphology of Reach 2B include the following:

- Changes in the discharge regime associated with the passage of Restoration Flows that significantly exceed pre-Restoration Flows, and the associated effect on both the sediment supply and in-channel energy to transport the sediment and erode the channel banks.
- Changes in sediment transport capacity due to changes in the channel hydraulics at any particular discharge due to changes in channel profile and cross-sectional shape that could affect the vertical and lateral stability of the main channel.
- Changes in water-surface profiles at the upstream end of Reach 2B that could affect bed material supply to the reach, and thus, the sediment balance (and aggradation/degradation tendencies) in the reach. These changes could also impact channel stability in the lower end of Reach 2A.
- Temporary increases in sediment supply to the downstream reaches due to increased erosion in Reach 2B as the channel adjusts to the higher Restoration Flows. This is particularly relevant to the alternatives that include Fresno Slough Dam, where the channel would downcut (or must be excavated to equilibrium grade) between Mendota Dam and San Mateo Avenue due to the base water surface level lowering associated with removal of the boards at Mendota Dam.
- Long-term increases in sediment supply to the downstream reaches due to the passage of higher Restoration Flows through Reach 2B.
- Changes in riparian vegetation caused by changes in the sustained flow under Restoration conditions in the upstream portion of Reach 2B and changes in the sustained water-surface elevations in the downstream portions of the reach. These changes could potentially impact in-channel capacity through changes in the overall hydraulic roughness and associated in-channel hydraulics, the overall

sediment transport capacity and sediment balance through the reach, the tendency for lateral erosion, and flood-carrying capacity.

- Increases in the magnitude and duration of overbank inundation associated with the higher Restoration Flows, removal of internal levees, and other overbank grading activities.

Numerous studies relating to the hydraulics, sediment transport and channel dynamics in Reach 2B for the various Project alternatives have previously been conducted (Mussetter Engineering, Inc. 2002, Tetra Tech 2011, Reclamation 2011). As a result, no new modeling studies were performed for this Environmental Impact Statement/Report; the impact analysis was performed by comparing quantitative estimates of the above factors based on results for the No-Action Alternative, four action alternatives, and existing conditions.

Water Quality

The evaluation of potential impacts to water quality due to the Project was primarily based on a comparison between existing, No-Action, and projected water quality and water quality objectives.

The Project would have the greatest potential to affect turbidity and constituents in sediment suspended by the Project. The Project could potentially generate suspended sediment loads to the river during construction and post-construction. These sediments may contain metals, pesticides, and other priority pollutants. Although the post-construction Reach 2B is expected to be primarily depositional, some alternatives may release suspended sediment related to localized erosion or scour as the channel reaches equilibrium.

14.3.2 Significance Criteria

Geomorphology

Specific thresholds for significance were based on criteria in the Environmental Checklist Form in Appendix G of the California Environmental Quality Act (CEQA) Guidelines, as amended, and other criteria as described below. Under National Environmental Policy Act (NEPA) Council on Environmental Quality (CEQ) Regulations, effects must be evaluated in terms of their context and intensity. Specific criteria that were used in assigning significance include the potential for the following:

- Substantially altering the existing drainage pattern of the site or area, including through the alteration of the course of the river, in a manner which would result in substantial erosion or siltation on- or off-site.
- Aggradation or degradation that causes a substantial increase in channel instability.
- Lateral erosion that could damage existing and/or proposed levees.
- Short- and long-term increases in sediment material load that could cause substantial increases in channel instability, loss of flood-carrying capacity, and reduced habitat quality in downstream reaches.

The significance of these potential changes was based on the magnitude of the change over existing conditions. Also considered are the likely effects of those changes on the ability of each alternative to meet restoration goals while continuing to meet flood-control and other public safety needs.

Water Quality

The thresholds of significance for impacts are based on the Environmental Checklist Form in Appendix G of the State CEQA Guidelines, as amended. Under NEPA CEQ Regulations, effects must be evaluated in terms of their context and intensity. These factors are considered when applying State CEQA Guidelines Appendix G. The Project would result in a significant impact on surface water resources and water quality if the Project would:

- Violate any water quality standards or waste discharge requirements.
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
- Increases in suspended-sediment loads that could have a substantial adverse effect on downstream water quality.
- Otherwise substantially degrade water quality.

14.3.3 Impacts and Mitigation Measures

This section provides an evaluation of direct and indirect effects of the Project alternatives on surface water resources. It includes analyses of potential effects relative to No-Action conditions in accordance with NEPA and potential effects compared to existing conditions to meet CEQA requirements. Existing conditions for surface water resources assessment is defined as the beginning of Interim Flows in water year 2010, rather than July 2009 when the Notice of Preparation was released because of the wealth of data collected under the Interim Flows component of the SJRRP. The physical changes associated with Project alternatives are then identified as separate from the recent Interim Flows conditions. The analysis is organized by Project alternative with specific impact topics numbered sequentially under each alternative. With respect to surface water, the environmental impact issues and concerns are:

Geomorphology

1. Substantially Altering the Existing Drainage Pattern, Including Alteration of the Course of the River, in a Manner which would Result in Substantial On- or Off-Site Erosion.
2. Increased Aggradation or Degradation that Causes a Substantial Increase in Channel Instability within Reach 2B.
3. Increases in Lateral Erosion that Could Damage Existing and/or Proposed Levees or Other Infrastructure within Reach 2B.
4. Short- and Long-Term Increases in Sediment Load that Could Cause Substantial Increases in Channel Instability in Downstream Reaches.

Water Quality

1. Construction-Related Effects on Water Quality.
2. Long-Term Effects on Water Quality from Mobilization of Mendota Pool Sediments.
3. Long-Term Effects on Water Quality from Floodplain Inundation of Prior Agricultural Soils.
4. Long-Term Effects on Water Quality from Agricultural Practices within the New Floodplain.

Other surface water-related issues covered in the PEIS/R are not covered here because they are programmatic in nature and/or are not relevant to the Reach 2B Mendota Pool Bypass Project area. These include beneficial long-term effects on instream surface water quality resulting from increases in releases of high-quality water from Friant Dam.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the SJRRP would be implemented, including habitat restoration in other reaches, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, the terms of the Settlement would not be met. This section describes impacts of the No-Action Alternative. The analysis is a comparison to existing conditions and no mitigation is required for No-Action.

The No-Action Alternative would maintain existing levee alignments and heights, and maximum conveyance would continue to be limited to the existing channel capacity. The Chowchilla Bypass would continue to bypass flood flows that exceed the capacity of Reach 2B.

Geomorphology

Impact GEM-1 (No-Action Alternative): ***Substantially Altering the Existing Drainage Pattern, Including Alteration of the Course of the River, in a Manner which Would Result in Substantial On- or Off-Site Erosion***. Under the No-Action Alternative, none of the facilities that are part of the Project would be constructed, and there would not be a change from existing conditions in levee alignments. As a result, there would be no physical changes to the existing drainage patterns within the reach, and there would be **no impact** to channel geomorphology.

Impact GEM-2 (No-Action Alternative): ***Increased Aggradation or Degradation that Causes a Substantial Increase in Channel Instability within Reach 2B.*** Previous sediment transport analyses by Tetra Tech (2011) and sediment transport modeling by Reclamation (2011) indicate that Reach 2B is slightly aggradational under conditions associated with the No-Action Alternative and existing conditions. Because long-term sediment deposition rates would be similar, there would be **no impact** to aggradation or degradation trends in the reach.

Impact GEM-3 (No-Action Alternative): ***Increases in Lateral Erosion that Could Damage Existing and/or Proposed Levees or Other Infrastructure within Reach 2B***. Future lateral erosion in Reach 2B will depend on the magnitude and duration of the flows, the characteristics of the bank material, and the amount and characteristics of the riparian vegetation. Lateral adjustment could occur under the No-Action Alternative as the channel adjusts to the increased magnitude and duration of flows. As discussed in Section 14.1.3, the planform alignment of Reach 2B has not changed substantially since at least the early part of the 20th century, and more likely, since the mid-1800s. Prior to construction of Friant Dam in the early- to mid-1940s, much higher flows regularly passed through Reach 2B than during either the recent historical period (i.e., prior to the Interim Flows program) or during the Interim Flows period. Based on these historical observations and the likelihood that the higher sustained flows would result in more riparian vegetation that tends to stabilize the channel banks, substantial lateral erosion is not anticipated under the No-Action Alternative. The impact to lateral erosion would be **less than significant**.

Impact GEM-4 (No-Action Alternative): ***Short- and Long-Term Increases in Sediment Load that Could Cause Substantial Increases in Channel Instability in Downstream Reaches***. Sediment transport analyses by Tetra Tech (2011) and sediment transport modeling by Reclamation (2011) indicate similar conditions associated with the No-Action Alternative and existing conditions. Sand inputs from Reach 2A would likely result in net deposition in the upper segment of Reach 2B and potentially down to the Mendota Pool, but Reach 3 would be subject to net erosion because Mendota Pool serves as a sediment trap for at least the sand and coarser portion of the sediment load passing through Reach 2B. Because sediment loads to Reach 3 and other downstream reaches would not substantially change, there would be a **less-than-significant** impact to downstream reaches.

Surface Water Quality

Impact SWQ-1 (No-Action Alternative): ***Construction-Related Effects on Water Quality.*** Under the No-Action Alternative, the Project would not be implemented and there would be no construction activities in the Project area. As a result, there would be **no impact** on water quality.

Impact SWQ-2 (No-Action Alternative): ***Long-Term Effects on Water Quality from Mobilization of Mendota Pool Sediments.*** Under the No-Action Alternative, the Project would not be implemented and operations of Mendota Dam would remain unmodified. Mendota Pool could expose potentially-contaminated sediments to Restoration Flows and downstream conveyance; however sediment transport to Reach 3 would be minimized by the obstruction of Mendota Dam. As a result, there would be a **less-than-significant** impact on water quality.

Impact SWQ-3 (No-Action Alternative): ***Long-Term Effects on Water Quality from Floodplain Inundation of Prior Agricultural Soils.*** Under the No-Action Alternative, the Project would not be implemented and the floodplain would not be widened. Compared to existing conditions, there would be no changes in long-term water quality in

the Project area due to exposure of new floodplain area to river flow. As a result, there would be **no impact** on water quality.

Impact SWQ-4 (No-Action Alternative): ***Long-Term Effects on Water Quality from Agricultural Practices within the New Floodplain.*** Under the No-Action Alternative, the Project would not be implemented and the floodplain would not be widened. Compared to existing conditions, there would be no changes in long-term water quality in the Project area due to agricultural practices in new floodplain areas. As a result, there would be **no impact** on water quality.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would entail construction of new Project facilities, including new levees to establish an approximately 3,000-foot-wide floodplain capable of safely conveying up to 4,500 cfs through the reach with 3 feet of freeboard. The Compact Bypass channel and levee system would be constructed to the north/east of the existing river channel to bypass Restoration Flows around Mendota Pool. Other key features include construction of a fish barrier below Mendota Dam, the Mendota Pool Dike (separating the San Joaquin River and Mendota Pool), and the South Canal and South Canal bifurcation structure, located near the upstream end of the reach, to deliver up to 2,500 cfs to Mendota Pool. The San Joaquin River control structure of the Chowchilla Bifurcation Structure would be removed, and the new South Canal bifurcation structure would be used to divert flood flows into the Chowchilla Bypass. The San Mateo Avenue crossing would be modified. No construction activities are proposed at or near Mendota Dam, which falls outside the Project boundary under Alternative A. Agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) would be allowed in the newly-created floodplain. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Geomorphology

Impact GEM-1 (Alternative A): ***Substantially Altering the Existing Drainage Pattern, Including Alteration of the Course of the River, in a Manner which Would Result in Substantial On- or Off-Site Erosion***. Compared to the No-Action Alternative, the course of the river within the footprint of Alternative A upstream from the Compact Bypass channel would not be directly changed by the Project. The Compact Bypass channel would, however, direct flows to the north around Mendota Pool. The Compact Bypass channel would be designed as an unlined earthen channel, would be approximately 5,300 feet long with a total corridor width of approximately 950 feet. Vegetated revetment would be included along both channel banks within the portion of the bypass containing the grade control structures to provide additional protection against flanking. Revetment would likely consist of buried riprap covered with topsoil, erosion control fabric, and native woody vegetation (see Section 2.2.5). Revetment would prevent substantial on-site erosion; thus, this change would not result in substantial on- or off-site erosion.

Under this alternative, the channel would be re-connected to the floodplain within the levees, changing the overbank drainage patterns compared to the No-Action Alternative. This would provide a beneficial effect to channel geomorphology by limiting the in-

channel energy and erosion potential at flows above bankfull and providing a sediment source to build and rejuvenate the floodplain.

In addition to its primary purpose of diverting flows into the South Canal, the South Canal bifurcation structure would also serve as a grade-control structure that would effectively fix the bed of the river at, and immediately upstream from, the structure, preventing channel downcutting in the upstream portion of Reach 2B that could result from downstream changes. Depending on the specific design, a local scour hole could develop on the downstream side of the structure that would cause a temporary increase in on-site erosion, particularly at high flows. However, protection measures would be incorporated into the structure to limit the adverse effects of this scour hole. Stone slope protection (riprap) would be provided on the upstream and downstream slopes of control structure embankments including some portions of the side slopes of the channel itself to prevent or minimize scouring. Riprap would be placed on bedding over geotextile fabric (see Section 2.2.5).

When comparing Alternative A to existing conditions, impacts to the existing drainage pattern would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Because Project design would prevent substantial on-site erosion and because new structures would limit in-channel energy and erosion potential, this impact is considered to be **less than significant.**

Impact GEM-2 (Alternative A): ***Increased Aggradation or Degradation that Causes a Substantial Increase in Channel Instability within Reach 2B.*** Compared to the No-Action Alternative, construction of the new levees and the Compact Bypass channel would allow up to 4,500 cfs of Restoration Flows to be carried through the reach. As a result, there would be a substantial increase in the magnitude and duration of flows and an associated increase in both the amount of sediment delivered to the reach from upstream and the amount of sediment that actually moves through the reach.

Compared to existing conditions, Alternative A would result in similar impacts as described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). The previously discussed sediment transport analyses by Tetra Tech (2011) and sediment-transport modeling by Reclamation (2011) indicate that Reach 2B is slightly aggradational under existing conditions, and this aggradational tendency would increase by a small amount (approximately 10 percent) for this alternative, in part due to reconnection of the channel with the floodplain and the associated effect of limiting in-channel energy and sediment transport capacity. Based on these studies, the aggradation does not appear to be sufficient to cause a substantial increase in channel instability; this impact would be **less than significant**.

Impact GEM-3 (Alternative A): ***Increases in Lateral Erosion that Could Damage Existing and/or Proposed Levees or Other Infrastructure within Reach 2B***. Compared to the No-Action Alternative, the duration of flows up to the existing capacity of Reach 2B would not change. However, with construction of the new levees and Compact Bypass channel under this alternative, flows up to 4,500 cfs would pass through the

reach; thus, there would be more energy available to drive lateral erosion. To protect levees from erosion, a 300-foot buffer between the river channel and levees would be provided. If the buffer cannot be provided along river bends or at structures, erosion protection such as revetment, bioengineering, or other erosion protection techniques would be implemented to prevent or minimize erosion (see Section 2.2.4).

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). Considering the historical lack of lateral erosion, even under the much higher flows during the pre-Friant Dam period and the likelihood that additional riparian vegetation that would tend to protect against bank erosion would establish along the reach, the inclusion of erosion protection offsets the potential for increases in lateral erosion. The impact on geomorphology would be **less than significant**.

Impact GEM-4 (Alternative A): ***Short- and Long-Term Increases in Sediment Load that Could Cause Substantial Increases in Channel Instability in Downstream Reaches***. Under Alternative A, Restoration Flows of up to 4,500 cfs would pass through Reach 2B and the Compact Bypass channel into Reach 3. Sediment transport analyses by Tetra Tech (2011) and sediment transport modeling by Reclamation (2011) indicates that this would cause a substantial increase in the sediment load to Reach 3, as compared to the No-Action Alternative, both due to the increase in flow conveyance capacity of Reach 2B and due to elimination of the buffering effect of Mendota Pool. Since the flows in Reaches 3 and 4A would be more frequently in the upper range of their capacities under Alternative A, the capacity of those reaches to transport the higher sediment supply would also increase. Estimates of the sediment transport balance in Reach 3 indicate that the reach would be in approximate sediment transport balance under this alternative; thus, there should not be substantial increases in downstream channel instability.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). The impact would be **less than significant**.

Surface Water Quality

Impact SWQ-1 (Alternative A): ***Construction-Related Effects on Water Quality.*** Compared to the No-Action Alternative, Alternative A would result in temporary adverse impacts to surface water quality due to the release of sediments and other contaminants during construction activities (without incorporation of appropriate best management practices or BMPs as mitigation described below). Construction activity is expected to occur intermittently over approximately 8.5 to 11 years. Construction activities, including grading, vegetation removal, excavation, trenching, and backfilling, have the potential to affect surface water quality, if not properly controlled. These activities could result in disturbed soils being temporarily exposed to the erosive forces of wind, rain, and stormwater runoff, which could result in the release of sediment into nearby water bodies, drainage ditches and the San Joaquin River. In addition to the release of sediment, contamination of stormwater runoff with typical chemicals used during construction such as fuels, oils, lead solder, solvents, and glues could occur through the daily use, transportation, and storage of these materials, if not properly controlled.

Flow in the San Joaquin River and operation of the existing Columbia Canal would be maintained during construction; therefore, construction of control structures in the river channel would require installation of removable cofferdams and temporary diversion of flows around the work area (see Construction Considerations in Section 2.2.4). Conveyance of sediment and other pollutants from construction areas to receiving waters could occur directly during in-water work or by direct overland flow.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). This impact is considered to be **potentially significant.**

Mitigation Measure SWQ-1 (Alternative A): ***Development and Implementation of SWPPP.*** A SWPPP consistent with the Statewide NPDES Construction General Permit (Order No. 2009-0009-DWQ, as amended) will be developed and implemented. The SWPPP will detail the construction-phase erosion and sediment control BMPs and the housekeeping measures for control of contaminants other than sediment, as well as the treatment measures and BMPs to be implemented for control of pollutants once the Project has been constructed. Erosion control BMPs will include source control measures such as scheduling of construction activities with regard to the rainy season, wetting of dry and dusty surfaces to prevent fugitive dust emissions, preservation of existing vegetation, and effective soil cover (e.g., geotextiles, straw much, hydroseeding) for inactive areas and finished slopes to prevent sediments from being dislodged by wind, rain, or flowing water. Sediment control BMPs will include measures such as street sweeping transportation corridors, and installation of fiber rolls and sediment basins to capture and remove particles that have already been dislodged. The SWPPP will establish good housekeeping measures such as construction vehicle storage and maintenance, handling procedures for hazardous materials, and waste management BMPs. These BMPs include procedural and structural measures to prevent release of wastes and materials used at the site. BMPs associated with installation of removable cofferdams and temporary diversion of flows around the work area will be described. The SWPPP will also describe post-construction BMPs to be implemented for control of pollutants once the Project has been constructed.

Implementation of the SWPPP would avoid or mitigate runoff pollutants at the construction sites to the "maximum extent practicable." (See also Chapter 13.0, "Hydrology – Groundwater," which addresses impacts to groundwater and Chapter 19.0, "Public Health and Hazardous Materials," which addresses impacts from release of hazardous materials during construction.) The impact would be **less than significant** after mitigation.

> **Implementation Action**: Project proponents and/or the construction contractor will prepare and implement an SWPPP consistent with requirements in the Statewide NPDES Construction General Permit. The SWPPP will set forth a BMP monitoring, maintenance, and reporting schedule and will identify the responsible entities during the construction and post-construction phases. Monitoring will include visual inspections of the BMPs, inspection for non-stormwater discharges, and visual inspection and/or sample collection of stormwater discharges. If

monitoring results indicate that the discharge is above the turbidity Numeric Action Level (NAL) or outside the range of the pH NAL, a construction site and run-on evaluation will be conducted to determine the source of the pollutant and corrective actions will be immediately implemented if necessary.

Location: Project areas with active construction or used by construction personnel, including access roads, staging and storage areas, borrow sites, and areas within the river channel and on adjacent uplands.

Effectiveness Criteria: Performance tracking will be based on successful compliance with the Statewide NPDES Construction General Permit.

Responsible Agency: Reclamation and the construction contractor.

Monitoring/Reporting Action: At a minimum, annual reports will be submitted to the SWRCB via the Storm Water Multiple Application and Report Tracking System.

Timing: The SWPPP will be developed prior to construction and will be implemented during construction.

Impact SWQ-2 (Alternative A): ***Long-Term Effects on Water Quality from Mobilization of Mendota Pool Sediments.*** Contaminants have been found in sediment accumulated in Mendota Pool above sediment quality thresholds including metals and persistent organic pollutants (i.e., arsenic, chromium, copper, nickel, 4,4'-DDD, and 4,4'-DDE). Concentrations of several constituents in elutriate derived from Mendota Pool sediments exceed water quality objectives (see Section 14.1.4). Contaminates were found to be uniformly distributed throughout Mendota Pool downstream of RM 205.5 with concentrations decreasing to insignificant levels above RM 207 (SJRRP 2012).

Compared to the No-Action Alternative, implementation of Alternative A could expose potentially-contaminated in-stream sediments to Restoration Flows and downstream conveyance. Alternative A includes construction of the Compact Bypass channel. The bypass channel would connect to Reach 2B approximately 0.9 mile upstream of Mendota Dam (approximately RM 205.5), bypass Mendota Pool to the north, and connect to Reach 3 approximately 0.6 mile downstream of Mendota Dam (approximately RM 204). The total elevation drop in the bypass channel would be approximately 12 feet (see Section 2.2.5). Grade-control structures would be included within the bypass channel to achieve the necessary elevation change between Reach 2B and Reach 3. The elevation of the upstream end of the bypass channel (which would be determined by the highest grade control structure in Alternative A) would influence erosion potential in the lower portion of Reach 2B. If the bypass channel is below existing grades, channel downcutting would occur. The increased erosion would be temporary as the channel adjusts to the new profile and Restoration Flow regime. Floodplain and channel grading could be used to establish a new equilibrium channel slope or to create more desirable sediment transport conditions to minimize erosion. Although there may be short-term erosion of potentially-contaminated sediments in areas upstream of the bypass channel (i.e., in the existing San

Joaquin River arm of Mendota Pool), the bypass would avoid the portions of Mendota Pool with the highest concentrations of contaminates and channel downcutting would be minimized by grade controls in the bypass channel. Transient increases in water quality contaminates would likely be diluted by increased flows to below water quality objectives.

Alternative A would not modify Mendota Dam or permanently lower Mendota Pool. Operations of Mendota Dam would be similar to operations under the No-Action Alternative (i.e., flashboards would be removed periodically for maintenance or flood flows).

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). The impact would be **less than significant**.

Impact SWQ-3 (Alternative A): ***Long-Term Effects on Water Quality from Floodplain Inundation of Prior Agricultural Soils.*** Compared to the No-Action Alternative, Restoration Flows under Alternative A could be exposed to soils containing metals, pesticides, and other priority pollutants on the new floodplain area. Portions of the existing levees would be removed and new levees would be constructed and set back from the river to form a narrow floodplain averaging approximately 3,000 feet wide. Land that is currently outside of the existing levees would be subject to periodic inundation by Restoration Flows. The area within the new Compact Bypass channel would also be subject to inundation.

Most of these areas are currently in agricultural production and have been for many years. Areas currently in agricultural production have been regularly irrigated and so potential surface contaminates that leach are likely to no longer be in the surface layer in even moderate concentrations. Other potential surface contaminants, such as legacy pesticides, bind tightly to soil organics, are relatively immobile in soil, and have a low tendency to leach.

Soil chemistry data are not available for areas currently in agricultural production; however, it is possible that the soils contain trace concentrations of herbicides and pesticides that are currently or were historically used in farming practices, including persistent organic pollutants such as DDT, its breakdown products (e.g., DDE), and dieldrin. Although DDT and dieldrin were banned for use in agriculture in the 1970s, they bind tightly to soils, are extremely persistent in the environment, highly toxic to many aquatic invertebrate species, and tend to biomagnify in the food chain. The reported half-life of DDT in soil is 2 to 15 years and the half-life of dieldrin in soil is 5 years. Newer pesticides are less likely to persist in soils or water. These persistent organic pollutants have been found in Mendota Pool sediments (SJRRP 2012) which suggests that they were historically used in the vicinity or have been influenced by inputs from the DMC. If persistent organic pollutants or other potential pollutants are present in soils on the floodplain or in the Compact Bypass channel, soil erosion could affect water quality in downstream reaches. Erosion protection such as revetment, bioengineering, or other erosion protection techniques would be implemented near levees and grade control

structures to protect the Compact Bypass from excess erosion. Other engineered structures would also be protected (see Section 2.2.5). In addition, once a vegetative cover is established, erosion on the floodplain would be reduced. Soil erosion is most likely to occur during flood flows, which would also provide dilution.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). The impact would be **potentially significant**.

Mitigation Measure SWQ-3 (Alternative A): ***Minimize Use of Pesticide and Herbicide Contaminated Soil.*** Refer to Mitigation Measure HAZ-4 (Alternative A). A similar mitigation measure would be used here. Construction activities in the Project area will be modified to minimize use of contaminated soil. Implementation of this mitigation measure would reduce this impact to a **less than significant** level.

> **Implementation Action:** The contractor will collect soil samples in conformance with EPA SW-846 methodology and analyze the samples for heavy metals and chlorinated pesticides and herbicides. The analytical results will be evaluated against EPA's Regional Screening Levels (2012), guidelines for freshwater disposal of dredge materials, aquatic toxicity screening levels, or other regulatory and literature guidance documents for aquatic toxicity. Alternatively, aquatic testing may be conducted on representative soil samples for this purpose. If the soil pesticide and herbicide conglomerate toxicity factors and/or toxicity testing shows unacceptable toxicity levels, that soil will not be used in the construction of Project levees and concentrated areas of contamination would be remediated in areas where the soil will come in direct contact with the San Joaquin River water.
>
> **Location:** Floodplain areas or areas used for borrow materials.
>
> **Effectiveness Criteria:** Effectiveness will be based on compliance with testing and risk assessment guidelines.
>
> **Responsible Agency:** Reclamation and the construction contractor.
>
> **Monitoring/Reporting Action:** Adequacy of the proposed construction practices will be confirmed with Reclamation managers and California State Lands Commission monitors.
>
> **Timing:** Prior to construction of Project levees or floodplain grading.

Impact SWQ-4 (Alternative A): ***Long-Term Effects on Water Quality from Agricultural Practices within the New Floodplain.*** Compared to the No-Action Alternative, Alternative A would increase the amount of direct runoff from agricultural land uses to Reach 2B. Between the main river channel banks and the proposed levees, agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) would occur.

The use of herbicides and pesticides are regulated by DPR. Requirements for the use of these materials, such as avoidance and minimization measures and BMPs, are printed on the manufacture's labels. Only certain herbicides or pesticides can be used near waterways or in areas that could be inundated and these compounds must be applied consistent with DPR regulations. If herbicides or pesticides are used on agricultural lands within the floodplain area, they would be applied by DPR licensed or certified applicators according to label requirements. Application would not occur when weather parameters exceed label specifications (for example, when wind exceeds specified speed) or when precipitation occurs or is forecasted with a specified period to prevent pesticides from entering the water through surface runoff. Applications would adhere to label directions for application rates.

Cattle could continue to have direct access to the river in some areas and would be a direct source of nutrients. The cattle may also damage riparian vegetation and expose soils to erosion. Fields in the new floodplain could be drained by ditches that convey agricultural return flows and runoff to the river. Flow in the ditches would contain nutrients and pesticides used in agricultural practices. There may be increased loadings of nutrients and agricultural chemicals to the San Joaquin River; however, agricultural practices would comply with the Irrigated Lands Regulatory Program, and increased flow rates would likely dilute these pollutants to below water quality objectives.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action Alternative). Therefore, the impact would be **less than significant**.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B would entail construction of new Project facilities, including new levees to establish an approximately 4,200-foot-wide floodplain capable of safely conveying up to 4,500 cfs through the reach with 3 feet of freeboard. The Compact Bypass channel and levee system would be constructed to the northeast of the existing river channel to bypass Restoration Flows around Mendota Pool. Other key features include construction of the Compact Bypass Bifurcation Structure, which would allow up to 2,500 cfs to be conveyed from Reach 2B into Mendota Pool, and construction of a fish passage structure for the Compact Bypass Control Structure. Flow would continue to enter at the upstream end of Reach 2B through the existing San Joaquin River control structure of the Chowchilla Bifurcation Structure. A fish passage facility would be added to the structure. The San Mateo Avenue crossing would be removed. No construction activities are proposed at or near Mendota Dam, which falls outside the Project boundary under Alternative B. The new floodplain would be selectively planted following construction with native vegetation and managed for non-native plant species. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Geomorphology

Impact GEM-1 (Alternative B): *Substantially Altering the Existing Drainage Pattern, Including Alteration of the Course of the River, in a Manner which Would Result in Substantial On- or Off-Site Erosion*. Compared to the No-Action Alternative, effects on

the existing drainage pattern under Alternative B would be the same as those described for Alternative A. Refer to Impact GEM-1 (Alternative A). This impact would be **less than significant.**

Impact GEM-2 (Alternative B): ***Increased Aggradation or Degradation that Causes a Substantial Increase in Channel Instability within Reach 2B.*** Compared to the No-Action Alternative, construction of the new levees and the Compact Bypass channel would allow up to 4,500 cfs of Restoration Flows to be carried through the reach. As a result, there would be a substantial increase in the magnitude and duration of flows and an associated increase in both the amount of sediment delivered to the reach from upstream and the amount of sediment that actually moves through the reach. There would also be an increase in the amount of material removed from the Reach 2B channel by river flows because the Compact Bypass channel in Alternative B would be designed to prevent long-term undesirable bed erosion or deposition problems in Reach 2B and the adjacent Reaches 2A and 3, especially at structures. The Compact Bypass design in Alternative B includes fewer grade control structures than the other alternatives, which would initiate channel bed erosion in Reach 2B to remove sediment that has been deposited in the San Joaquin River arm of Mendota Pool. This channel bed erosion is anticipated to be up to 7 to 8 feet deep near the upstream end of the Compact Bypass and gradually decrease to zero erosion approximately 4 miles further upstream (RM 210). The channel bed erosion in Reach 2B would result in sediment deposition in the Reach 3 channel. The Reach 3 deposition is anticipated to be up to 7 feet thick near the downstream end of the bypass and gradually decrease to zero deposition approximately 1 mile downstream (RM 203). These changes in the bed profile are expected to occur over the first 6 to 15 years post-construction depending on flows. The amount of degradation in Reach 2B and resulting aggradation in Reach 3 would be controlled by the Compact Bypass bifurcation structure as well as grade control structures in the bypass channel.

Compared to existing conditions, Alternative B would result in similar impacts as described in the preceding paragraph (i.e., the comparison of Alternative B to the No-Action Alternative). The previously discussed sediment transport analyses by Tetra Tech (2011) and sediment-transport modeling by Reclamation (2011) indicate that Reach 2B is slightly aggradational under existing conditions, and this aggradational tendency would decrease and become erosional in portions of Reach 2B for this alternative, due to design intent of the Compact Bypass. The degradation would be controlled by the Compact Bypass bifurcation structure as well as grade control structures in the bypass channel and does not appear to be sufficient to cause a substantial increase in channel instability; this impact would be **less than significant**.

Impact GEM-3 (Alternative B): ***Increases in Lateral Erosion that Could Damage Existing and/or Proposed Levees or Other Infrastructure within Reach 2B.*** Compared to the No-Action Alternative, the duration of flows up to the existing capacity of Reach 2B would not change. However, with construction of the new levees and Compact Bypass channel under this alternative, flows up to 4,500 cfs would pass through the reach; thus, there would be more energy available to drive lateral erosion. The degradation in Reach 2B and aggradation in Reach 3 (discussed above in Impact GEM-2 (Alternative B)) could induce some bank erosion adjacent to these areas, but the Project

design would include riparian vegetation, rock vanes, woody materials, or revetment to protect against bank erosion in susceptible areas. In addition, the neck of the first meander bend downstream from the Chowchilla Bifurcation Structure is only about one channel width wide (approximately 280 feet). Although this area has not eroded significantly during the period of available photography, the bend could cut off very rapidly if lateral erosion does occur at this location. This would not endanger the levees in the reach, but it would steepen the local channel gradient, which could cause bed lowering on the downstream side of the Chowchilla Bifurcation Structure. To protect levees from erosion, a 300-foot buffer between the river channel and levees would be provided. If the buffer cannot be provided along river bends or at structures, erosion protection such as revetment, bioengineering, or other erosion protection techniques would be implemented to prevent or minimize erosion (see Section 2.2.4).

When comparing Alternative B to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to the No-Action Alternative). Considering the historical lack of lateral erosion, even under the much higher flows during the pre-Friant Dam period and the likelihood that additional riparian vegetation that would tend to protect against bank erosion would establish along the reach, the inclusion of erosion protection offsets the potential for increases in lateral erosion. The impact on geomorphology would be **less than significant**.

Impact GEM-4 (Alternative B): ***Short- and Long-Term Increases in Sediment Load that Could Cause Substantial Increases in Channel Instability in Downstream Reaches***. Under Alternative B, Restoration Flows of up to 4,500 cfs would pass through Reach 2B and the Compact Bypass channel into Reach 3. Sediment transport analyses by Tetra Tech (2011) and sediment transport modeling by Reclamation (2011) indicates that this would cause a substantial increase in the sediment load to Reach 3, as compared to the No-Action Alternative, both due to the increase in flow conveyance capacity of Reach 2B and due to elimination of the buffering effect of Mendota Pool. There would also be an increase in the amount of material removed from the Reach 2B channel by river flows because the Compact Bypass channel in Alternative B would be designed to prevent long-term undesirable bed erosion or deposition problems in Reach 2B and the adjacent Reaches 2A and 3, especially at structures (see discussion above in Impact GEM-2 (Alternative B)). Since the flows in Reaches 3 and 4A would be more frequently in the upper range of their capacities under Alternative B due to the increased capacity in Reach 2B, the capacity of those reaches to transport the higher sediment supply would also increase. Estimates of the sediment transport balance in Reach 3 indicate that the reach would range from being in approximate sediment transport balance to slightly aggradational in the short term and slightly degradational over the long term under this alternative; thus, there should not be substantial increases in downstream channel instability.

When comparing Alternative B to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to the No-Action Alternative). The impact would be **less than significant**.

Surface Water Quality

Impact SWQ-1 (Alternative B): *Construction-Related Effects on Water Quality.* Construction-related effects on water quality under Alternative B would be similar to those described for Alternative A. Refer to SWQ-1 (Alternative A) for details. The primary difference under Alternative B is the longer construction duration of 9 to 13 years. This impact is considered to be a **potentially significant** impact.

Mitigation Measure SWQ-1 (Alternative B): *Development and Implementation of SWPPP.* Refer to Mitigation Measure SWQ-1 (Alternative A). The same measure would be used here. A SWPPP will be developed and implemented which details the construction-phase erosion and sediment control BMPs and the housekeeping measures for control of contaminants other than sediment, as well as the treatment measures and BMPs to be implemented for control of pollutants once the Project has been constructed . This impact would be **less than significant after mitigation**.

Impact SWQ-2 (Alternative B): *Long-Term Effects on Water Quality from Mobilization of Mendota Pool Sediments.* Contaminants have been found in sediment accumulated in Mendota Pool above sediment quality thresholds including metals and persistent organic pollutants (i.e., arsenic, chromium, copper, nickel, 4,4'-DDD, and 4,4'-DDE). Concentrations of several constituents in elutriate derived from Mendota Pool sediments exceed water quality objectives (see Section 14.1.4). Contaminates were found to be uniformly distributed throughout Mendota Pool downstream of RM 205.5 with concentrations decreasing to insignificant levels above RM 207 (SJRRP 2012).

Compared to the No-Action Alternative, implementation of Alternative B could expose potentially-contaminated in-stream sediments to Restoration Flows and downstream conveyance. Alternative B includes construction of the Compact Bypass channel. The bypass channel would connect to Reach 2B approximately 0.9 mile upstream of Mendota Dam (approximately RM 205.5), bypass Mendota Pool to the north, and connect to Reach 3 approximately 0.6 mile downstream of Mendota Dam (approximately RM 204). The total elevation drop in the bypass channel would range approximately from 2 to 7 feet (see Section 2.2.6). Grade-control structures would be included within the bypass channel to achieve the necessary elevation change between Reach 2B and Reach 3. The elevation of the upstream end of the bypass channel (which in Alternative B would be determined by the Compact Bypass river control structure) would influence erosion potential in the lower portion of Reach 2B. The bypass channel would be constructed below existing grades, and channel downcutting in Reach 2B would occur. The increased erosion would be temporary as the channel adjusts to the new profile and Restoration Flow regime. Floodplain and channel grading could be used to establish a new equilibrium channel slope or to create more desirable sediment transport conditions to minimize erosion. Although there may be short-term erosion of potentially-contaminated sediments in areas upstream of the bypass channel (i.e., in the existing San Joaquin River arm of Mendota Pool), the bypass would avoid the portions of Mendota Pool with the highest concentrations of contaminates and amount of channel downcutting would be controlled by the Compact Bypass river control structure and grade control structures in the bypass channel. Transient increases in water quality contaminates would likely be diluted by increased flows to below water quality objectives.

Alternative B would not modify Mendota Dam or permanently lower Mendota Pool. Operations of Mendota Dam would be similar to operations under the No-Action Alternative (i.e., flashboards would be removed periodically for maintenance or flood flows).

When comparing Alternative B to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative B to the No-Action Alternative). The impact would be **less than significant**.

Impact SWQ-3 (Alternative B): *Long-Term Effects on Water Quality from Floodplain Inundation of Prior Agricultural Soils.* Long-term effects on water quality of Restoration Flows within the new floodplain under Alternative B would be similar to those described for Alternative A. Refer to SWQ-3 (Alternative A) for details. The primary difference under Alternative B is that the larger floodplain area could encompass more farmland acreage. This impact would be **potentially significant**.

Mitigation Measure SWQ-3 (Alternative B): *Minimize Use of Pesticide and Herbicide Contaminated Soil.* Refer to Mitigation Measure SWQ-3 (Alternative A). The same measure would be used here. Construction activities in the Project area will be modified to minimize use of contaminated soil. Implementation of this mitigation measure would reduce this impact to a **less than significant** level.

Impact SWQ-4 (Alternative B): *Long-Term Effects on Water Quality from Agricultural Practices within the New Floodplain.* Similar to the effects described for Alternative A, agricultural practices would continue under Alternative B in the proposed floodplain between the main river channel banks and the proposed levees. There may be increased loadings of nutrients and agricultural chemicals to the San Joaquin River; however, agricultural practices would comply with the Irrigated Lands Regulatory Program, and increased flow rates would likely dilute these pollutants to below water quality objectives. Direct impacts of those practices on water quality in the San Joaquin River would be **less than significant**.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C would entail construction of new Project facilities, including new levees to establish an approximately 3,000-foot-wide floodplain capable of safely conveying up to 4,500 cfs through the reach with 3 feet of freeboard. A new dam would be constructed across Fresno Slough to contain Mendota Pool so that up to 4,500 cfs of Restoration Flows can be conveyed downstream through the existing river channel and across the existing Mendota Dam sill into Reach 3. A portion of river sediments that have accumulated behind Mendota Dam would be removed and disposed of appropriately. A new Short Canal with a control structure capable of delivering up to 2,500 cfs from the river in Reach 2B to Mendota Pool would be constructed near the new dam. Other key features include construction of fish passage facilities at Mendota Dam, a fish screen on the Short Canal to prevent juvenile fish from entering Mendota Pool, and a fish barrier located just north of Fresno Slough dam to prevent adult fish from migrating into Fresno Slough during Kings River flood releases. The Chowchilla Bifurcation Structure would continue to divert San Joaquin River flows into Chowchilla Bypass during flood

operations. A fish passage facility would be added to the San Joaquin River control structure of the Chowchilla Bifurcation Structure to provide upstream fish passage. The San Mateo Avenue crossing would be modified. The new floodplain would be planted following construction with native vegetation and managed for non-native plant species. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Geomorphology

Impact GEM-1 (Alternative C): *Substantially Altering the Existing Drainage Pattern, Including Alteration of the Course of the River, in a Manner which Would Result in Substantial On- or Off-Site Erosion*. Compared to the No-Action Alternative, the course of the river within the footprint of Alternative C would not be changed by the Project. The existing Mendota Dam would be modified to provide run-of-the-river conditions during Restoration Flows, which would lower water-surface elevations and steepen the effective channel gradient through the San Joaquin River arm of Mendota Pool, increasing erosion potential in this area. The concrete sill at the existing dam would, however, remain in-place, providing grade control for the upstream reach and limiting the amount of downcutting that could occur in the upstream channel. The Project would excavate portions of the former pool impoundment area (i.e., the San Joaquin arm of Mendota Pool) to establish a new equilibrium channel slope (see Section 2.2.7) minimizing the amount of sediments being washed downstream when Mendota Dam is lowered. Some additional channel erosion may occur as the channel adjusts to future flows, but this erosion is expected to be relatively minor. Sediment levels in the Fresno Slough arm of Mendota Pool are expected to be similar as the No-Action Alternative because the water surface elevations would be maintained at levels similar to No-Action conditions.

When comparing Alternative C to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative C to No-Action Alternative). As a result, this impact would be **less than significant.**

Impact GEM-2 (Alternative C): *Increased Aggradation or Degradation that Causes a Substantial Increase in Channel Instability within Reach 2B.* Compared to the No-Action Alternative, there would be a substantial increase in the magnitude and duration of high flow events and an associated increase in both the amount of sediment delivered to the reach from upstream and the amount of sediment that actually moves through the reach. In contrast to No-Action Alternative, Alternative C is expected to have increased degradation in the lower portion of the reach. Channel bed degradation and associated increase in bank heights may also cause an increase in bank instability.

Mendota Dam would be modified to provide run-of-the-river conditions, which would lower water-surface elevations and steepen the effective channel gradient through the reach, increasing erosion potential in the San Joaquin River arm of Mendota Pool. However, the Project would excavate portions of the former pool impoundment area (i.e., the San Joaquin arm of Mendota Pool) to establish a new equilibrium channel slope (see Section 2.2.7) minimizing the amount of sediments being washed downstream when Mendota Dam is lowered. Some additional degradation may occur during Restoration

Flows as the upstream channel adjusts to the lowered base-level control resulting from modifications to Mendota Dam.

According to an assessment of the equilibrium channel slope for this alternative, if portions of the former pool impoundment area were not excavated, the bank heights under Alternative C would increase by an average of 3.5 feet in approximately 4.5 miles of the downstream end of Reach 2B, as compared to the No-Action Alternative. Potential channel bed degradation associated with Alternative C would not progress sufficiently far upstream to impact either the new San Mateo Avenue crossing or the Chowchilla Bifurcation Structure.

Although levees and infrastructure within the potential degradation zone could be affected by an increase in bank erosion where they are in close proximity to the channel, a new equilibrium channel slope would be established to minimize channel downcutting (see Section 2.2.7) and appropriate levee protection measures, such as revetment, would be included near proposed structures (see Section 2.2.4). These measures would minimize the risk of channel instability.

When comparing Alternative C to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative C to No-Action Alternative). This impact would be **less than significant**.

Impact GEM-3 (Alternative C): ***Increases in Lateral Erosion that Could Damage Existing and/or Proposed Levees or Other Infrastructure within Reach 2B***. Refer to Impact GEM-2 (Alternative C). The potential for increased bank erosion and bank height under this alternative could lead to increases in lateral erosion that could damage proposed levees and other infrastructure. However, the Project would incorporate erosion protection as described in GEM-3 (Alternative A). As a result, impacts on geomorphology would be **less than significant**.

Impact GEM-4 (Alternative C): ***Short- and Long-Term Increases in Sediment Load that Could Cause Substantial Increases in Channel Instability in Downstream Reaches***. Compared to the No-Action Alternative, Alternative C would increase flow capacity in Reach 2B and, as discussed under Alternatives A and B, the increase in Restoration Flows passing through Reach 2B (i.e., flows between the existing safe channel capacity and the design capacity of 4,500 cfs) would increase sediment loading to the downstream reaches. In addition, Mendota Pool serves as a sediment trap for at least the sand and coarser portion of the sediment load passing through the upstream part of Reach 2B under the No-Action Alternative. Under Alternative C, the flash boards currently used to close the bays at Mendota Dam and back up water would be removed to provide run-of-the-river conditions during Restoration Flows. The modifications to Mendota Dam that would increase the gradient through the San Joaquin River arm of Mendota Pool (e.g., removing the flash boards) would reduce the effectiveness of the sediment trap in Mendota Pool, and sediment that would otherwise have been stored in Mendota Pool would pass directly downstream into Reach 3 causing short-term increases in the downstream sediment load into Reach 3. Sediment from the Fresno Slough arm of

Mendota Pool that would have been trapped behind Mendota Dam under the No-Action Alternative would likely be trapped behind Fresno Slough Dam under Alternative C.

Under the No-Action Alternative, the flash boards at Mendota Dam would have been periodically removed to facilitate maintenance on the structure, during which time some of the sediment trapped in Mendota Pool would be re-entrained and carried downstream into Reach 3, limiting the long-term sediment trapping effects. As a result, substantial increases in the long-term sediment load to downstream reaches (i.e., Reach 3) would be limited under Alternative C, and actually would be closer to a desired condition in which there is continuous sediment continuity through Reach 2B.

When comparing Alternative C to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative C to No-Action Alternative). As a result, this impact would be **less than significant**.

Surface Water Quality

Impact SWQ-1 (Alternative C): ***Construction-Related Effects on Water Quality.*** Construction-related effects on water quality would be the same under Alternative C as those described for Alternative A. Refer to SWQ-1 (Alternative A) for details. The primary difference under Alternative C is the potentially shorter construction duration of 7.5 to 11 years. This impact is considered to be a **potentially-significant** impact.

Mitigation Measure SWQ-1 (Alternative C): ***Development and Implementation of SWPPP.*** Refer to Mitigation Measure SWQ-1 (Alternative A). The same measure would be used here. A SWPPP will be developed and implemented which details the construction-phase erosion and sediment control BMPs and the housekeeping measures for control of contaminants other than sediment, as well as the treatment measures and BMPs to be implemented for control of pollutants once the Project has been constructed. This impact would be **less than significant** after mitigation.

Impact SWQ-2 (Alternative C): ***Long-Term Effects on Water Quality from Mobilization of Mendota Pool Sediments.*** Compared to No-Action Alternative, Mendota Dam would be modified under Alternative C to provide run-of-the-river conditions during Restoration Flows, which would lower water-surface elevations, steepen the effective channel gradient through the San Joaquin River arm of Mendota Pool, and increase the erosion potential in this area. Concentrations of several constituents in elutriate derived from these sediments exceed water quality objectives. Lowering the water surface elevation behind Mendota Dam would expose potentially-contaminated in-stream sediments to Restoration Flows and downstream conveyance. The increased erosion would be temporary as the channel adjusts to the new profile and Restoration Flow regime. The Project would excavate portions of the former Pool impoundment area (i.e., the San Joaquin arm of Mendota Pool) to establish a new equilibrium channel slope to minimize the amount of sediments being washed downstream when Mendota Dam is lowered. Although there may be short-term erosion of potentially-contaminated sediments, increased flow rates would likely dilute potential pollutants to below water quality objectives.

When comparing Alternative C to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative C to the No-Action Alternative). The impact would be **less than significant**.

Impact SWQ-3 (Alternative C): ***Long-Term Effects on Water Quality from Floodplain Inundation of Prior Agricultural Soils.*** Long-term effects on water quality of Restoration Flows within the new floodplain under Alternative C would be the same as those described for Alternative A. Refer to SWQ-3 (Alternative A) for details. The primary different is that Alternative C does not include the Compact Bypass. This impact would be **potentially significant**.

Mitigation Measure SWQ-3 (Alternative C): ***Minimize Use of Pesticide and Herbicide Contaminated Soil.*** Refer to Mitigation Measure SWQ-3 (Alternative A). The same measure would be used here. Construction activities in the Project area will be modified to minimize use of contaminated soil. Implementation of this mitigation measure would reduce this impact to a **less than significant** level.

Impact SWQ-4 (Alternative C): ***Long-Term Effects on Water Quality from Agricultural Practices within the New Floodplain.*** Similar to the No-Action Alternative and existing conditions, agricultural practices under Alternative C would remain outside of the floodplain levees and direct impacts of those practices on water quality in the San Joaquin River would be limited. There would be **no impact**.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D would entail construction of new Project facilities, including new levees to establish an approximately 4,200-foot-wide floodplain capable of safely conveying up to 4,500 cfs through the reach with 3 feet of freeboard. As with Alternative C, a new dam would be constructed across Fresno Slough to contain Mendota Pool so that up to 4,500 cfs of Restoration Flows can be conveyed downstream through the existing river channel and across the existing Mendota Dam into Reach 3. A portion of river sediments that have accumulated behind Mendota Dam would be removed and disposed of appropriately. A new North Canal and North Canal bifurcation structure, capable of delivering up to 2,500 cfs from the river in Reach 2B to Mendota Pool, would be constructed. Three potential locations have been identified for the North Canal bifurcation structure (RM 209.8, RM 213.4 and RM 214.2). The river control structure of the North Canal bifurcation structure would include fish passage facilities. Other key features include removal of the San Joaquin River control structure of the Chowchilla Bifurcation Structure, construction of fish passage facilities at Mendota Dam, a fish screen on the North Canal to prevent juvenile fish from entering Mendota Pool, and a fish barrier located just north of the Fresno Slough Dam to prevent adult fish from migrating into Fresno Slough during Kings River flood releases. The San Mateo Avenue crossing would be modified. Agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) would be allowed in the newly-created floodplain. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Geomorphology

Impact GEM-1 (Alternative D): ***Substantially Altering the Existing Drainage Pattern, Including Alteration of the Course of the River, in a Manner which Would Result in Substantial On- or Off-Site Erosion***. Refer to Impact GEM-1 (Alternative A); the potential impact of the North Canal bifurcation structure would be essentially the same as the South Canal bifurcation structure. Refer also to Impact GEM-1 (Alternative C); the impact in the approximately 4.5-mile reach upstream from the existing Mendota Dam would be essentially the same. This impact would be **less than significant**.

Impact GEM-2 (Alternative D): ***Increased Aggradation or Degradation that Causes a Substantial Increase in Channel Instability within Reach 2B.*** Refer to Impact GEM-2 (Alternative C). Effects on the existing drainage pattern under Alternative D would be the same as those described for Alternative C. This impact would be **less than significant**.

Impact GEM-3 (Alternative D): ***Increases in Lateral Erosion that Could Damage Existing and/or Proposed Levees or Other Infrastructure within Reach 2B***. Refer to Impact GEM-3 (Alternative C). Effects on lateral erosion under Alternative D would be the same as those described for Alternative C. This impact would be **less than significant**.

Impact GEM-4 (Alternative D): ***Short- and Long-Term Increases in Sediment Load that Could Cause Substantial Increases in Channel Instability in Downstream Reaches***. Refer to Impact GEM-4 (Alternative C). Effects on short-and long-term increases in sediment load under Alternative D would be the same as those described for Alternative C. This impact would be **less than significant**.

Surface Water Quality

Impact SWQ-1 (Alternative D): ***Construction-Related Effects on Water Quality.*** Construction-related effects on water quality under Alternative D would be the same as those described for Alternative A. Refer to SWQ-1 (Alternative A) for details. The primary difference under Alternative D is the potentially longer construction duration of 8 to 13 years. This impact is considered to be **potentially significant**.

Mitigation Measure SWQ-1 (Alternative D): ***Development and Implementation of SWPPP.*** Refer to Mitigation Measure SWQ-1 (Alternative A). The same measure would be used here. A SWPPP will be developed and implemented which details the construction-phase erosion and sediment control BMPs and the housekeeping measures for control of contaminants other than sediment, as well as the treatment measures and BMPs to be implemented for control of pollutants once the Project has been constructed. This impact would be **less than significant** after mitigation.

Impact SWQ-2 (Alternative D): ***Long-Term Effects on Water Quality from Mobilization of Mendota Pool Sediments.*** Long-term effects on water quality of Mendota Dam modification under Alternative D would be the same as those described for Alternative C. Refer to SWQ-2 (Alternative C) for details. The impact would be **less than significant**.

Impact SWQ-3 (Alternative D): ***Long-Term Effects on Water Quality from Floodplain Inundation of Prior Agricultural Soils.*** Long-term effects on water quality of Restoration Flows within the new floodplain under Alternative D would be the same as those described for Alternative A. Refer to SWQ-3 (Alternative A) for details. The primary different is that Alternative C does not include the Compact Bypass. This impact would be **potentially significant**.

Mitigation Measure SWQ-3 (Alternative D): ***Minimize Use of Pesticide and Herbicide Contaminated Soil.*** Refer to Mitigation Measure SWQ-3 (Alternative A). The same measure would be used here. Construction activities in the Project area will be modified to minimize use of contaminated soil. Implementation of this mitigation measure would reduce this impact to a **less than significant** level.

Impact SWQ-4 (Alternative C): ***Long-Term Effects on Water Quality from Agricultural Practices within the New Floodplain.*** Long-term effects on water quality of agricultural practices within the new floodplain under Alternative D would be the same as those described for Alternative A. Refer to SWQ-4 (Alternative A) for details. The impact would be **less than significant**.

15.0 Hydrology - Wetlands and Aquatic Resources

This chapter describes the environmental and regulatory setting for wetlands and other non-wetland waters of the United States in the Project area, analyzes the environmental consequences associated with Project alternatives, and identifies wetland impacts and mitigation measures, as appropriate. For the purposes of this document, wetlands and other aquatic resources (e.g., streams, lakes, and ponds) are a subset of waters of the United States. Biological resources such as aquatic species (e.g., fish, invertebrates, vegetation) are addressed in the biological resource chapters (Chapters 5, 6 and 7).

15.1 Environmental Setting

During the past century, the aquatic resources of the San Joaquin River and the Project area have undergone substantial changes because of human related activities. Extensive wetland areas were drained or filled. Many introduced species have spread and contributed to elimination or marginalization of native species. The decline of wetlands and associated native species has become a matter of public concern.

15.1.1 Existing Conditions

Biological resources addressed in this section include wetlands and other non-wetland waters of the United States. Existing conditions are the baseline biological resource conditions at the time of the Notice of Preparation/Notice of Intent distribution in July 2009. The baseline condition of these biological resources was determined through review of scientific literature, existing data sources, and field wetland delineations. In the case of wetlands, field data were collected at later dates, after the start of Interim Flows. Therefore, the best available information to describe existing conditions was typically from the period after the start of Interim Flows. Interim Flows substantially amplified flows in the river and elevated ordinary high water marks (OHWM).[1]

15.1.2 Categories for Wetlands and Other Waters of the United States

Three categories of potential jurisdictional wetlands were identified in the Project area, as well as potential other waters of the United States. The three wetland categories were riparian wetland, wet meadow, and marsh. Table 15-1 summarizes the acreage of each category of potential jurisdictional wetland and other waters of the United States in the Project area. The California Department of Fish and Wildlife (DFW) considers riparian wetland, wet meadow, and marsh as sensitive natural communities due to their limited distribution in California (DFW 2009; Hickson 2009). These wetland habitat types are described below.

[1] The OHWM is defined as the upper boundary of the active river channel along the bank and by lack of vegetation below it.

Table 15-1.
Project Area Wetlands and Waters of the United States

Wetland and Non-Wetland Type	Area (acres)
Riparian Wetlands	181.3
Wet Meadows	54.5
Marshes	81.3
Non-Wetland Waters of the United States	473.3
Total Riparian, Wetlands, and Other Waters	790.4

Riparian Wetlands

There are two primary types of riparian wetlands in the Project area – riparian forest and riparian scrub. They are described and analyzed together because they typically co-occur.

Riparian forest consists of the Fremont cottonwood forest (*Populus fremontii* forest alliance) and Oregon ash groves (*Fraxinus latifolia* forest alliance), and these typically occur along levees, floodplain terraces, and in concave depressions. At higher elevation and better drained soils, Fremont cottonwood forest dominates and integrates with sandbar and black willow.

Riparian scrub usually occurs in disturbed habitats along ditches and levees. Riparian scrub vegetation grows 10 to 30 feet tall and is dominated by the following vegetation alliances: black willow thickets (*Salix gooddingii* woodland alliance), buttonwillow thickets (*Cephalanthus occidentalis* shrubland alliance), red willow thickets (*Salix laevigata* woodland alliance), arrow weed thickets (*Pluchea sericea* shrubland alliance), blue elderberry stands (*Sambucus nigra* shrubland alliance), California rose briar patches (*Rosa californica* shrubland alliance), sandbar willow scrub (*Salix exigua* shrubland alliance) and silver bush lupine scrub (*Lupinus albifrons* shrubland alliance). Black willow prevails at lower elevations near the bankfull elevation[2] in areas dominated by poorly drained soils and flat topography. Mixed marsh and wet meadow species often occur in the adjacent understory in the vicinity of the riparian wetlands.

Wet Meadows

Meadows are herbaceous communities dominated by mixtures of perennial grasses and forbs with other grass-like species, such as rushes (*Juncus* species) and sedges (*Carex* species). Some meadows in the Project area include scattered riparian shrubs and trees, but do not contain enough woody vegetation to be included in the riparian scrub or riparian woodland wetland categories. Wet meadows are often located adjacent to dry meadows and other upland areas that are higher above the groundwater table. They typically include flat or concave surface relief and occur in low-lying troughs and basins with poorly drained soils near the San Joaquin River or its tributaries. These site characteristics help maintain extended periods of soil saturation or flooding during the growing season. The vegetation alliances that occur in the wet meadow wetlands are yerba mansa meadows (*Anemopsis californica* herbaceous alliance), creeping rye grass

[2] The bankfull elevation occurs where the stream completely fills its channel at maximum capacity.

turfs (*Leymus triticoides* herbaceous alliance), salt grass flats (*Distichlis spicata* herbaceous alliance) and non-native annual grasslands.

Wet meadows occur throughout the Project area and are sometimes used for livestock grazing. They occur in swales, drainages, and on lower riparian terraces. These wetlands receive water from the high water table, overbank flooding and sheet drainage from excessive runoff during winter, spring, and early summer. Tarplant (*Centromadia pungens*), yerba mansa (*Anemopsis californica*), alkali heath (*Frankenia grandiflora*), salt grass (*Distichlis spicata*), and creeping wildrye (*Leymus triticoides*) often occur in wet meadows in the Project area. The higher quality wetlands of this type are located in the downstream portion of the reach, near Mendota Pool.

Marshes

The marsh wetlands in the Project area consist of mixed marsh vegetation alliances that are dominated by annual and perennial emergent vegetation with varying amounts of herbs and grass-like species. The vegetative cover is often very dense. In contrast to meadow communities, which have seasonally saturated soils, marsh communities have saturated or inundated soils throughout most of the year, except in some cases, during the dry months of late summer. River water retained by the Mendota Dam is the principal source of water for marshes in the Project area. The vegetation alliances that were observed in the marsh wetlands are California bulrush marsh (*Schoenoplectus californicus* herbaceous alliance), pale spike rush marshes (*Eleocharis macrostachya* herbaceous alliance) and cattail marshes (*Typha* species herbaceous alliance).

Potential Non-Wetland Other Waters of the United States

Additional aquatic elements in the Project area were identified as potential, jurisdictional non-wetland other waters of the United States based on the presence of defined bed and bank, drift lines and/or OHWM. These features (typically, the river channel between the OHWMs, areas of backed up water upstream of Mendota Dam, non-maintained irrigation and drainage ditches, and other small tributaries in the Project area) were mapped using a combination of field measurements and aerial photography. These waters of the United States lack hydrophytic vegetation[3] typically required to qualify as a wetland. Their limits are set by the OHWM. As directed by the Corps, the OHWM for potential other waters of the United States that are connected to the river is defined by the level on the bank that water reached during the highest Interim Flows in 2010. The limits of the OHWM for historical natural water features that are no longer connected to the river is indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas (Corps 2005). Actively managed agricultural irrigation ditches, stock ponds and larger agricultural ponds were not considered other waters of the United States.

[3] Hydrophytic vegetation refers to plants that are adapted to live in saturated soil, flooded areas, or high groundwater conditions.

15.2 Regulatory Setting

This section presents the applicable Federal, State, and local laws and regulations associated with waters of the United States in the Project area.

The U.S. Army Corps of Engineers (Corps) and the U.S. Environmental Protection Agency (EPA) define wetlands as "those areas that are saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for the life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." Waters of the United States, as defined in 33 Code of Federal Regulations (CFR) 328.3(a) and 40 CFR 230.3(s), include:

- All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide.
- All interstate waters including interstate wetlands.
- All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mud flats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural basins, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters which are or could be used by interstate or foreign travelers for recreational or other purposes; or from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or which are used or could be used for industrial purposes by industries in interstate commerce.
- All impoundments of waters otherwise defined as waters of the United States under the definition.
- Tributaries of waters identified by the definition above.
- Territorial seas.
- Wetlands adjacent to waters (other than waters that are themselves wetlands) identified by the definition above.

Additional information about these natural resources can be found in the following documents:

- *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Corps 2008a).
- *A Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region of the Western United States, a Delineation Manual* (Corps 2008b).

Waters that are themselves wetlands, while they may or may not be under Federal jurisdiction, typically are under State jurisdiction.

15.2.1 Federal

Federal laws and regulations pertaining to waters of the United States located in the Project area are summarized briefly below. More detail on regulatory compliance procedures can be found in Chapter 27, "Consultation, Coordination, and Compliance" and the *Technical Memorandum on Regulatory Compliance* (San Joaquin River Restoration Program [SJRRP] 2011) for Reach 2B.

Clean Water Act

The Clean Water Act (CWA) is the major Federal legislation governing the water quality aspects of the project. The objective of the act is "to restore and maintain the chemical, physical, and biological integrity of the nation's waters." The CWA establishes the basic structure for regulating discharge of pollutants into the waters of the United States and gives EPA the authority to implement pollution control programs, such as setting wastewater standards for industries. In certain states such as California, EPA has delegated some water quality regulatory authority to State agencies.

Under Section 404 of the CWA, the Corps regulates the disposal of dredged and fill materials into "waters of the United States." These jurisdictional waters of the United States include intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, and wetlands adjacent to any water of the United States (33 CFR Part 328). In areas subject to tidal influence, Section 404 jurisdiction extends to the high-tide line plus adjacent wetlands. Certain waters of the United States are considered "special aquatic sites" because they are generally recognized as having particular ecological value. Such sites include sanctuaries and refuges, mudflats, wetlands, vegetated shallows, coral reefs, and riffle and pool complexes. Special aquatic sites are defined by EPA and may be afforded additional consideration in the permit process for a project.

Projects that impact jurisdictional wetlands and non-wetland waters of the United States require a permit from the Corps. There are two types of permits: individual permits and general permits. Individual permits include standard permits and letters of permission. General permits include nationwide permits, regional general permits, and programmatic general permits. Nationwide permits are issued by the Corps for specific types of activities that have minimal individual or cumulative adverse environmental impacts. Individual permits are required for more complex projects that exceed the impact threshold for nationwide permits.

Section 303 of the CWA requires states to adopt water quality standards for surface waters. The three major components of water quality standards are designated users, water quality criteria, and anti-degradation policy. Section 303(d) of the CWA requires States and authorized Native American tribes to develop a list of water quality-impaired segments of waterways. The list includes waters that do not meet water quality standards necessary to support the beneficial uses of a waterway, even after point sources of pollution have had minimum required levels of pollution control technology installed. Only waters impaired by "pollutants" (e.g., clean sediments, nutrients such as nitrogen and phosphorus, pathogens, acids/bases, temperature, metals, cyanide, and synthetic organic chemicals), not those impaired by other types of "pollution" (e.g., altered flow,

channel modification), are to be included on the list. Section 303(d) of the CWA also requires States to maintain a list of impaired water bodies so that a total maximum daily load (TMDL) of criteria pollutants can be established. A TMDL is a plan to restore the beneficial uses of a stream or to otherwise correct an impairment. It establishes the allowable pollutant loadings or other quantifiable parameters (e.g., pH, temperature) for a water body and thereby provides the basis for establishing water quality-based controls. The calculation for establishing TMDLs for each water body must include a margin of safety to ensure that the water body can be used for the purposes of State designation. Additionally, the calculation also must account for seasonal variation in water quality. The Central Valley Regional Water Quality Control Board (CVRWQCB) develops TMDLs for the San Joaquin River. The upstream end of Reach 2B is listed as impaired for invasive species and Mendota Pool is listed as impaired for mercury and selenium. The associated TMDLs are expected to be complete by 2021 (see Chapter 14.0, "Hydrology – Surface Water Resources and Water Quality.")

CWA Section 402 created the National Pollutant Discharge Elimination System permit program. This program covers point sources of pollution discharging into a surface water body. Stormwater discharges during Project construction would be subject to the permit requirements of the Construction General Permit, which requires the Project proponents to develop and implement a Stormwater Pollution Prevention Plan (see Chapter 14.0, "Hydrology – Surface Water Resources and Water Quality.")

Rivers and Harbors Act Section 10

Section 10 of the Rivers and Harbors Act (33 United States Code 401 et seq.) requires authorization from the Corps for construction of any structure over, in, or under, excavation of material from, or deposition of material into navigable waters of the United States. Reach 2B is considered a navigable section of the San Joaquin River (Corps 2014).

Executive Order 11990: Protection of Wetlands

This Executive Order (EO) directs Federal agencies to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in implementing civil works.

U.S. Coast Guard

The U.S. Coast Guard is responsible for approval of the location and plans of bridges and causeways constructed across navigable waters of the United States. In addition, the Coast Guard is responsible for approval of the location and plans of international bridges and the alteration of bridges found to be unreasonable obstructions to navigation. Project actions are not anticipated to affect the locations or plans of bridges or causeways constructed across navigable waters of the United States.

15.2.2 State of California

State laws and regulations pertaining to wetlands are discussed below.

Porter-Cologne Water Quality Control Act

Division 7 of the California Water Code, known as the Porter-Cologne Water Quality Control Act, regulates activities that affect water quality and authorizes the State Water Resources Control Board and the DFW to regulate wetland and non-wetland "Waters of the State" features, to allocate surface water rights, permit diversions, and to control the use of water throughout the State. Waters of the State are defined in California Water Code section13050, as amended, as "any surface water or groundwater, including saline waters, within the boundaries of the State."

California Fish and Game Code

Sections of the California Fish and Game Code provide environmental protections for fish and wildlife resources. Diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by DFW, pursuant to Fish and Game Code section 1602.

California State Lands Commission

The California State Lands Commission (CSLC) has exclusive jurisdiction over all ungranted tidelands and submerged lands owned by the State, and the beds of navigable rivers, sloughs, and lakes. A project cannot use these State lands unless a lease is first obtained from the CSLC.

California Harbors and Navigation Code

The California Harbors and Navigation Code details the jurisdictions of the California Department of Parks and Recreation, Division of Boating and Waterways , which focus development of public access to waterways, safety of vessels and boating facilities, and on-the-water safety. Coordination with the Division of Boating and Waterways regarding design standards for future boating facilities could be required for installing new or modifying existing boating facilities, such as boat ramps, docks, or marinas.

15.2.3 Regional and Local

Regional and local plans and policies pertaining to wetlands are discussed below. As required by State law, counties in the Project vicinity have developed their own general plans. At a minimum, these documents must address the topics of land use, transportation, housing, conservation, open space, noise, and safety. These documents serve as statements of county goals, policies, standards, and implementation programs for the physical development of a county, and include the *Fresno County General Plan Policy Document* (2000) and the *Madera County General Plan Policy Document* (1995).

Fresno County General Plan

The Fresno County General Plan Policy Document (Fresno County 2000) outlines several policies for wetlands and riparian areas.

- Policies OS-D.1 to OS-D.3 supports a no-net loss wetland policy for the county, required projects to mitigate for loss of wetlands functions and values, and requires that best management practices be used to reduce pollutants and siltation near wetlands.

- Policy OS-D.4 requires a riparian protection zone around natural watercourses with buffers of 100 feet in width as measured from the top of the bank of unvegetated channels and 50 feet in width as measured from the outer edge of the dripline of riparian vegetation.
- Policy OS-D.7 supports the management of wetland and riparian plant communities for passive recreation, groundwater recharge, nutrient storage, and wildlife habitats.

Madera County General Plan

The Madera County General Plan Policy Document (Madera County 1995) outlines several policies for wetlands and riparian areas.

- Policies 5.D.2 and 5.D.3 require that wetland loss be mitigated in both regulated and non-regulated wetlands through any combination of avoidance, minimization, or compensation and that projects be designed in such a manner that pollutants and siltation would not significantly adversely affect the value or function of wetlands.
- Policy 5.D.4 requires riparian protection zones around natural watercourses with buffers of 100 feet in width as measured from the top of bank of unvegetated channels and 50 feet in width as measured from the outer edge for the canopy of riparian vegetation.

15.3 Environmental Consequences and Mitigation Measures

15.3.1 Impact Assessment Methodology

In order to evaluate where wetlands and other aquatic resources could potentially occur in the Project area, records from the U.S. Geological Survey 7.5 minute quadrangle for Mendota Dam (quadrangle 381D) in the National Wetlands Inventory database, maintained by the U.S. Fish and Wildlife Service (USFWS) (USFWS 2009), and records from the surrounding eight quadrangles (Jamesan, Tranquillity, Coit Ranch, Firebaugh, Poso Farm, Firebaugh NE, Bonita Ranch and Gravelly Ford) were reviewed. In addition, the following literature and other data sources were reviewed to evaluate potential impacts to waters of the United States in the Project area:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002).
- National Wetlands Inventory Maps.
- Aerial photographs of the Project area and vicinity.
- U.S. Department of Agriculture soil surveys of Fresno and Madera Counties, California (Natural Resources Conservation Service [NRCS] 2015, Soil Conservation Service [SCS] 1971, SCS 1962).
- Standard biological references and field guides including the Jepson Manual (Hickman 1993).

Jurisdictional wetland delineation surveys were also performed in 2010 and 2011 in areas where access was granted from private landowners. Wetland delineations in the Project area were conducted in accordance with the methodology presented in the *Corps of Engineers Wetlands Delineation Manual* (Corps 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West* (Corps 2008a). A full description of the methodology was provided in *Existing Environmental Conditions: Data Needs and Survey Approach* (SJRRP 2010). The extent of wetlands in areas where access was not granted was estimated based on field work on adjacent properties, contour maps and aerial photography.

Based on the presence of wetlands and other aquatic resources in the Project area, a methodology for impact evaluation for wetlands and other aquatic resources was developed. Waters of the United States identified in the Project area were overlaid with Project impact areas in a Geographic Information System platform to determine the types and extent of waters of the United States potentially affected by the Project.

Potential impacts of the Project on wetland resources were characterized by evaluating direct, indirect, temporary, and permanent impacts. Direct impacts include the removal or loss of wetlands within the footprint of ground disturbing actions. Indirect impacts result from changes to habitat that are incidental to project implementation such as altering the water supply to existing wetlands. Temporary impacts have a short duration, and wetlands would be expected to recover or be restored within 3 to 5 years after Project implementation. An example would be the temporary diversion of water flows to install infrastructure, followed by wetland re-establishment. A permanent impact would involve the long-term alteration of wetland habitats such as wetland filling, removal, or flooding or dewatering of an area. An example would be the lowering the normal water elevation adjacent to a marsh area which then forms an upland riparian terrace lacking hydrology for wetlands.

15.3.2 Significance Criteria

State California Environmental Quality Act (CEQA) Guidelines Appendix G and National Environmental Policy Act (NEPA) Council on Environmental Quality (CEQ) Regulations were used to determine the significance of wetland impacts. Impacts on wetlands were assessed by estimating the potential changes to the quantity and quality of wetland habitats expected to develop over time under the Project alternatives with the wetland habitats condition under the No-Action Alternative. A key assumption is that conditions predicted to result with implementation of each Project alternative would occur within 50 years of Project implementation.

Under NEPA CEQ Regulations, impacts must be evaluated in terms of their context and intensity. Significant impacts may be beneficial or adverse and are considered equally. An example of a significant beneficial impact would be the conversion of a cattail marsh habitat to a habitat with greater functions and values for less common or listed species (such as a yerba mansa meadow).

These factors have been considered when applying the State CEQA Guidelines, which state that the Project would result in a significant impact to wetland resources if it would

have a substantial adverse effect on any wetland riparian habitat, other wetland habitat, or other waters identified in local or regional plans, policies, or regulations, or by the DFW or USFWS. Examples of such effects are listed below.

- Have a substantial adverse effect either directly or indirectly on federally protected (jurisdictional) wetlands as defined by Section 404 of the CWA (including, but not limited to, marsh, riparian wetlands, seasonal wetlands etc.) through removal, filing, hydrological interruption, or other means.
- Have the potential to degrade the quality of the environment, substantially reduce the habitat of listed or sensitive wetland plant species or threaten to eliminate a wetland plant community.
- Conflict with any local policies or ordinances protecting wetland resources, such as a wetland protection policy, wetland protection ordinance, adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan.

15.3.3 Impacts and Mitigation Measures

This section provides an evaluation of the effects of the Project alternatives on jurisdictional wetlands. With respect to wetlands and other waters of the United States, the primary environmental impact issue and concern is the following:

1. Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands and Other Waters during Construction.
2. Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands or Other Waters during the Operations and Maintenance Phase.
3. Conflict with Provisions of Local or Regional Plans Regarding Conservation Lands.

See also Chapter 6.0, "Biological Resources – Vegetation," for a discussion of impacts to riparian habitat and other sensitive vegetation communities and Chapter 7.0, "Biological Resources – Wildlife," for a discussion of habitat conservation plans. Other wetland-related issues covered in the Program Environmental Impact Statement/Report (PEIS/R) are not covered here because they are programmatic in nature and/or are not relevant to the Project area.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the SJRRP would be implemented, including habitat restoration, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these activities would not achieve the Settlement goals. The potential effects of the No-Action Alternative are described below. The analysis is a comparison to existing conditions, and no mitigation is required for No-Action.

Impact WET-1 (No-Action Alternative): *Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands and Other Waters during*

Construction. Under the No-Action Alternative, facilities and channels would not be constructed or modified in the Project area. Actions that could fill, fragment, isolate, divert, or substantially alter wetlands or other waters of the United States would not be implemented. There would be **no impact**.

Impact WET-2 (No-Action Alternative): *Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands and Other Waters during the Operations and Maintenance Phase.* Under the No-Action Alternative, Restoration Flows in Reach 2B may recruit new vegetation along the wetted channel banks and riparian habitat would mature in areas upstream of San Mateo Avenue low flow/dip crossing. Wetland habitats supported by Mendota Pool would be maintained by the relatively stable water level held by Mendota Dam. Creation and enhancement of riparian habitat upstream of Mendota Pool would be a **beneficial** effect.

Impact WET-3 (No-Action Alternative): *Conflict with Provisions of Local or Regional Plans Regarding Conservation Lands.* The No-Action Alternative would not reduce the effectiveness of the Madera and Fresno counties' general plan conservation strategies, and attainment of conservation plan goals and objectives would not otherwise be prevented. The No-Action Alternative could result in beneficial effects on these plans because it would support attainment of goals or objectives related to enhancing wetlands and riparian areas along Reach 2B. This would be a **beneficial** effect.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would include construction of Project facilities including a Compact Bypass channel, a new levee system encompassing the existing river channel in a narrow floodplain, and the South Canal. Other key features include construction of the Mendota Pool Dike (separating the San Joaquin River and Mendota Pool), a fish barrier below Mendota Dam, and the South Canal bifurcation structure and fish passage facility, modification of the San Mateo Avenue crossing, and the removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

This alternative includes passive riparian habitat restoration and grazing or farming in the floodplain. It is assumed that over time wetland communities would develop within the main channel and that a dense riparian scrubland would develop along the main river channel banks. The Restoration Flows would be used to recruit new vegetation along the channel from the existing seed bank. Between the main river channel banks and the proposed levees, limited agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) would occur.

Impact WET-1 (Alternative A): *Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands and Other Waters during Construction.* Construction activities have the potential to result, indirectly or directly, in adverse effects on jurisdictional waters of the United States and waters of the State, including wetlands. Compared to the No-Action Alternative, implementing Alternative A would result in channel modifications in Reach 2B to divert the river into the Compact Bypass channel for fish passage. This and other actions may involve dredging, grading, and

recontouring within the OHWM of waters of the United States. As a result, dredged or fill materials would be discharged into waters of the United States, and permanent fill of Corps jurisdictional wetlands could occur.

Project actions to manage channel habitat may also result in temporary or permanent fill of waters of the United States, including wetlands. Channel habitat enhancement could involve dredging, grading, and recontouring to connect the existing channel to the Compact Bypass, which would result in discharge of fill material. In addition, some adjacent wetlands could be permanently filled or isolated by constructing control structures within the channel. These actions could result in loss of not only the filled wetlands, but any associated adjacent wetland habitat.

Construction of haul roads, staging areas, new levees, and other potential ancillary facilities could result in temporary or permanent fill of waters of the United States, including wetlands. Constructing and installing fish passage facilities, fish barriers, and new control structures, as well as modifying existing control structures and road crossings, and other Project actions, could also result in placement of fill into waters of the United States.

Although many of the Project actions could result in discharge of dredged or fill material into waters of the United States, including wetlands, most of these activities would not result in permanent loss of acreage, functions, or values of wetland habitats. New low-flow channel, side-channel, bypass channel, and floodplain habitat would be created and these and other modified areas of river reaches and bypasses would continue to convey water and support aquatic habitat.

Table 15-2 summarizes the impact acreage for Alternative A for each category of potentially jurisdictional wetlands and other waters in the Project area. These acreages represent the worst-case scenario where all existing floodplain areas are assumed to be impacted. “Infrastructure” generally refers to area permanently converted to structures, levees or roads. “Floodplain” refers to the floodplain of the San Joaquin River; the acreage impacted under this category may be disturbed up to 3 years following construction, but eventually would return to natural habitat or agriculture. “Borrow” refers to the maximum amount of habitat that could be disturbed to take fill materials for levees. Other impacts refer to construction staging areas, temporary access roads and other construction-related disturbances. Areas temporarily disturbed during construction would be restored to previous contours, if feasible, and then seeded with a native vegetation seed mixture to prevent soil erosion. Some areas, such as borrow areas, may not be feasible to restore previous contours, but these areas would be smoothed and seeded (see Section 2.2.4).

Table 15-2.
Wetlands and Waters of the United States Potentially Affected by Alternative A

Type	Maximum Impacted Area (acres)			
	Floodplain (future habitat or agriculture)	Infrastructure (not future habitat)	Borrow (future habitat or agriculture)	Other (future habitat or agriculture)
Riparian Wetlands	79.3	20.3	2.5	23.2
Wet Meadows	52.2	3.2	-	<0.02
Marshes	39.3	3.6	4.6	0.9
Non-Wetland Waters of the United States	351.6	50.5	9.9	31.9
Total Riparian, Wetlands, and Other Waters	522.4	77.7	17.0	56.0

Notes:
Floodplain = floodplain of the San Joaquin River (passive restoration and agricultural activities)
Infrastructure = structures, levees, or roads
Borrow = maximum amount disturbed to take fill materials for levees (reseeded)
Other = construction staging areas, temporary access roads, and other construction-related disturbances (reseeded)

The Project alternatives (including Alternative A) include specific conservation measures to avoid, minimize, or compensate for adverse effects on waters of the United States and waters of the State, including wetlands (as described in Table 2-8 of Chapter 2.0, "Description of Alternatives"), and these measures would be implemented as part of the Project alternative. Temporary impacts of the Project alternative would be minimized by implementation of conservation measures that require coordination with the Corps, identification and quantification of wetlands and waters of the United States/waters of the State, obtaining permits, and full compensation for any loss of wetlands and other waters of the United States/waters of the State. Implementing Conservation Measures WUS-1 and WUS-2 would ensure that loss and degradation of waters of the United States, and other wetland habitats, would be avoided and minimized during construction activities, to the extent feasible. Implementing Conservation Measures WUS-1 and WUS-2 would ensure that any wetland habitat or other waters of the United States that could not feasibly be avoided would be replaced, restored, or enhanced so that the Project would result in no net loss of aquatic acreage, functions, and values. Because conservation measures will be implemented as part of the Project, Alternative A would not have substantial effects on jurisdictional wetlands by construction of facilities or during other construction-related Project actions (e.g., habitat restoration).

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action Alternative). Impacts would be **less than significant**.

Impact WET-2 (Alternative A): ***Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands and Other Waters during the Operations and Maintenance Phase.*** Compared to the No-Action Alternative, Alternative A would result in expanding the river's floodplain and increasing the flow conveyance capacity of the

reach. These changes, in combination with Restoration Flows, have the potential to result in both adverse and beneficial effects on jurisdictional waters of the United States and waters of the State, including wetlands. The increase in flows could permanently inundate and thus eliminate some wetlands, but also expand or create additional areas of wetlands. Additionally, the reduction in normal water elevation in certain portions of Reach 2B caused by removal of the influence of Mendota Pool would drain and dewater some wetlands during some portions of the year, but would also expand or create additional areas of wetlands. After Project completion, in most instances, affected waters of the United States would be expected to have improved habitat functions as compared to No-Action conditions for several reasons: (1) fish habitat would be enhanced, (2) floodplain habitat would be expanded and enhanced, and (3) riparian habitat would be enhanced.

Long-term passive riparian habitat restoration of the San Joaquin River would improve native floodplain and in-channel habitats. Perennial base flows and seasonal high flows in the river would promote the establishment of riparian vegetation, wet meadows, and marshes and increase overall floodplain connectivity. Alternative A would restore river-floodplain connectivity and longitudinal connectivity of riparian vegetation near the channel and enhance landscape connectivity between the river corridor and adjacent sloughs or tributary channels.

When comparing Alternative A to existing conditions, effects would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). According to habitat restoration estimates, Alternative A could support up to 720 acres of wetlands and other waters within hydric soils in of the floodplain and bypass area. This is a 10 percent increase in acreage as compared to existing conditions. Wetland plant species can also become established in other areas of the floodplain, however without hydric soils these other areas would not qualify as jurisdictional wetlands.[4] Alternative A is expected to result in long-term **beneficial** effects to wetlands and other waters.

Impact WET-3 (Alternative A): ***Conflict with Provisions of Local or Regional Plans Regarding Conservation Lands.*** Compared to the No-Action Alternative, Alternative A would not conflict with the provisions of the Fresno and Madera counties' general plans regarding conservation lands. The Project would not result in long-term net loss of acreage, functions, or values of wetland habitats or riparian areas, interfere with the management of conserved lands, or eliminate opportunities for conservation actions. The Project is expected to result in a long-term increase in wetland and riparian habitats. These consequences of implementing the Project would benefit general plans that strive to conserve, restore, and enhance these habitats. The Project would enhance opportunities to implement conservation strategies and attain conservation goals by providing hydrologic conditions and floodplain areas necessary to restore wetlands.

[4] Growth of hydrophytic plants in areas without hydric soils is generally rare and usually only happens in transition zones between wetlands and uplands, transitional zones at and below the OHWM, and where fill has occurred recently.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative) and would result in supporting county general plans. This is a **beneficial** effect.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B would include construction of Project features including a Compact Bypass channel, a new levee system with a wide, consensus-based floodplain encompassing the river channel, and the Compact Bypass Bifurcation Structure with fish passage facility. Other key features include construction of a fish passage facility at the San Joaquin River control structure at the Chowchilla Bifurcation Structure, the re-route of Drive 10 ½ (across the Compact Bypass control structure), and removal of San Mateo Avenue crossing. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

This alternative includes a mixture of active and passive riparian and floodplain habitat restoration and compatible agricultural activities in the floodplain. Active restoration planting would occur along the low flow channel of the river and in riparian establishment areas to establish a riparian area and seed bank, and floodplain areas would be seeded with native plants. Natural riparian recruitment (passive restoration) would promote continual habitat succession, particularly in areas where sediment is deposited or vegetation is removed by natural processes. Plantings that are wetland species or borderline wetland species would be irrigated as necessary during the establishment period of 3 to 5 years. Maintenance, monitoring, and long-term management would be conducted following revegetation.

Impact WET-1 (Alternative B): ***Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands and Other Waters during Construction.*** Refer to Impact WET-1 (Alternative A). Potential impacts of Alternative B would be similar to potential impacts of Alternative A, with the following exceptions. Construction of the Project under Alternative B would affect the acreages of wetlands and other waters shown in Table 15-3. Alternative B has less potentially impacted area for each of the major Project impact categories (i.e., floodplain, infrastructure, borrow, and other) compared to Alternative A. As described under Impact WET-1 (Alternative A), avoidance, minimization, and compensation for loss of wetlands and other waters would reduce adverse effects during construction. Impacts of Alternative B would be **less than significant**.

Table 15-3.
Wetlands and Waters of the United States Potentially Affected by Alternative B

Type	Maximum Impacted Area (acres)			
	Floodplain	Infrastructure	Borrow	Other
	(future habitat)	(not future habitat)	(future habitat or agriculture)	
Riparian Wetlands	79.0	24.5	3.4	3.9
Wet Meadows	51.3	-	-	-
Marshes	47.3	0.1	3.2	0.9
Non-Wetland Waters of the United States	339.3	22.0	5.0	13.3
Total Riparian, Wetlands, and Other Waters	517.0	46.5	11.6	18.1

Notes:
Floodplain = floodplain of the San Joaquin River (returns to habitat)
Infrastructure = structures, levees, or roads
Borrow = maximum amount disturbed to take fill materials for levees (reseeded)
Other = construction staging areas, temporary access roads, and other construction-related disturbances (reseeded)

Impact WET-2 (Alternative B): ***Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands and Other Waters during the Operations and Maintenance Phase.*** Refer to Impact WET-2 (Alternative A). Potential impacts for Alternative B are similar to potential impacts of Alternative A, with the following exceptions. According to habitat restoration estimates, Alternative B could support up to 840 acres of wetlands and other waters within hydric soils in of the floodplain and bypass area. This is more than a 40 percent increase in acreage compared to existing conditions. Wetland plant species could also become established in other areas of the floodplain, however without hydric soils these other areas would not become jurisdictional wetlands. Alternative B also includes natural channel erosion in Reach 2B (in the approximate 4 miles upstream of the Compact Bypass) and some sediment deposition in Reach 3 (in the approximate 1 mile downstream of the Compact Bypass) in order to re-establish stable sediment transport. Downcutting and sedimentation may affect existing wetland vegetation adjacent to the river channel, but new wetland vegetation would be expected to establish in these areas. Alternative B is expected to have long-term **beneficial** effects to wetlands and other waters.

Impact WET-3 (Alternative B): ***Conflict with Provisions of Local or Regional Plans Regarding Conservation Lands.*** Refer to Impact WET-3 (Alternative A). Potential impacts for Alternative B would be the same as potential impacts of Alternative A. This would be a **beneficial** effect.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)
Alternative C would include construction of Project features including Fresno Slough Dam, a new levee system with a narrow floodplain encompassing the river channel, and the Short Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the Short Canal control structure and fish

screen, the Chowchilla Bifurcation Structure fish passage facility, modification of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Similar to Alternative B, Alternative C includes active riparian and floodplain habitat restoration. It is assumed that wetland communities would develop within the main channel, that a dense riparian scrubland would develop along the main river channel banks, and that bands of other habitat types (wetland, scrub, grassland, and forest) would develop at higher elevations along the channel corridor. The wetland, floodplain, and riparian areas would be planted following construction and then irrigated, monitored, maintained, and managed as necessary during the establishment period.

Impact WET-1 (Alternative C): ***Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands and Other Waters during Construction.*** Refer to Impact WET-1 (Alternative A). Potential impacts of Alternative C would be similar to potential impacts of Alternative A. Construction of the Project would affect the acreages wetlands and other waters shown in Table 15-4. As described under Impact WET-1 (Alternative A), avoidance, minimization, and compensation for loss of wetlands and other waters would reduce adverse effects during construction. Impacts of Alternative C would be **less than significant**.

Table 15-4.
Wetlands and Waters of the United States Potentially Affected by Alternative C

Type	Maximum Impacted Area (acres)			
	Floodplain (future habitat)	Infrastructure (not future habitat)	Borrow (future habitat or agriculture)	Other (future habitat or agriculture)
Riparian Wetlands	112.1	13.8	11.7	18.6
Wet Meadows	52.2	-	-	<0.02
Marshes	48.1	6.4	3.0	7.2
Non-Wetland Waters of the United States	390.2	33.7	17.3	64.0
Total Riparian, Wetlands, and Other Waters	602.6	53.9	32.0	89.8

Notes:
Floodplain = floodplain of the San Joaquin River (active restoration)
Infrastructure = structures, levees, or roads
Borrow = maximum amount disturbed to take fill materials for levees (reseeded)
Other = construction staging areas, temporary access roads, and other construction-related disturbances (reseeded)

Impact WET-2 (Alternative C): ***Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands and Other Waters during the Operations and Maintenance Phase.*** Refer to Impact WET-2 (Alternative A). Potential impacts for Alternative C are similar to potential impacts of Alternative A with the following exceptions. Alternative C includes active riparian and floodplain habitat restoration. Wetland, floodplain, and riparian areas would be planted following construction and then

irrigated and managed as necessary during the establishment period. According to habitat restoration estimates, Alternative C could support up to 760 acres of wetlands and other waters within hydric soils in of the floodplain and Fresno Slough Dam area. This would be a slight increase in acreage compared to existing conditions. Wetland plant species can also become established in other areas of the floodplain, however without hydric soils these other areas would not qualify as jurisdictional wetlands. Alternative C is expected to have long-term **beneficial** effects to wetlands and other waters.

Impact WET-3 (Alternative C): *Conflict with Provisions of Local or Regional Plans Regarding Conservation Lands.* Refer to Impact WET-3 (Alternative A). Potential impacts for Alternative C would be the same as potential impacts of Alternative A. This would be a **beneficial** effect.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D would include construction of Project features including Fresno Slough Dam, a new levee system with a wide floodplain encompassing the river channel, and the North Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the North Canal bifurcation structure and North Canal fish passage facility, removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure, removal of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Similar to Alternative A, Alternative D includes passive riparian habitat restoration and farming in the floodplain. It is assumed that over time wetland communities would develop within the main channel and that a dense riparian scrubland would develop along the main river channel banks. The Restoration Flows would be used to recruit new vegetation along the channel from the existing seed bank. Between the main river channel banks and the proposed levees, limited agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) would occur.

Impact WET-1 (Alternative D): *Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands and Other Waters during Construction.* Refer to Impact WET-1 (Alternative A). Potential impacts of Alternative D are similar to potential impacts of Alternative A, with the following exception. Construction of the Project would affect the acreages of wetlands and other waters shown in Table 15-5. As described under Impact WET-1 (Alternative A), avoidance, minimization, and compensation for loss of wetlands and waters would reduce the potential for adverse effects during construction. Impacts of Alternative D would be **less than significant**.

Table 15-5.
Wetlands and Waters of the United States Potentially Affected by Alternative D

Type	Maximum Impacted Area (acres)			
	Floodplain	Infrastructure	Borrow	Other
	(future habitat or agriculture)	(not future habitat)	(future habitat or agriculture)	
Riparian Wetlands	116.4	16.4	4.3	15.9
Wet Meadows	51.9	0.3	-	<0.02
Marshes	48.1	4.9	3.0	8.1
Non-Wetland Waters of the United States	376.2	65.5	6.0	58.2
Total Riparian, Wetlands, and Other Waters	592.7	87.1	13.3	82.2

Notes:
Floodplain = floodplain of the San Joaquin River (passive restoration and agricultural activities)
Infrastructure = structures, levees, or roads
Borrow = maximum amount disturbed to take fill materials for levees (reseeded)
Other = construction staging areas, temporary access roads, and other construction-related disturbances (reseeded)

Impact WET-2 (Alternative D): ***Fill, Fragment, Isolate, Divert, or Substantially Alter Potentially Jurisdictional Wetlands and Other Waters during the Operations and Maintenance Phase.*** Refer to Impact WET-2 (Alternative A). Potential impacts for Alternative D are similar to potential impacts of Alternative A. Alternative D includes passive riparian habitat restoration and farming in the floodplain. Restoration Flows would be used to recruit new vegetation along the channel from the existing seed bank. Between the main river channel banks and the proposed levees, agricultural practices (e.g., annual crops, pasture, or floodplain-compatible permanent crops) would occur. According to habitat restoration estimates, Alternative D could support up to 880 acres of wetlands and other waters within hydric soils in of the floodplain and Fresno Slough Dam area. This is more than a 15 percent increase in acreage compared to existing conditions. Wetland plant species can also become established in other areas of the floodplain, however without hydric soils these other areas would not qualify as jurisdictional wetlands. Alternative D is expected to result in long-term **beneficial** effects to wetlands and other waters.

Impact WET-3 (Alternative D): ***Conflict with Provisions of Local or Regional Plans Regarding Conservation Lands.*** Refer to Impact WET-3 (Alternative A). Potential impacts for Alternative D would be the same as potential impacts of Alternative A. This would be a **beneficial** effect.

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16.0 Land Use Planning and Agricultural Resources

This chapter evaluates the potential land use and related agricultural impacts anticipated with implementation of the Project, including effects on agricultural resources due to farmland being removed from production. The analysis covers both short-term effects during construction and long-term effects resulting from implementation of restoration actions and operation of new Project facilities.

16.1 Environmental Setting

The agricultural and land use setting describes current land uses and ownership patterns in the Project area, which covers portions of Fresno and Madera counties in California. The predominant land use in the Project area is agriculture. Accordingly, the focus of this section is on agriculture, including cropping patterns, farmland designations as developed by the California Department of Conservation (DOC), and lands under Williamson Act contracts. Information is also provided on current land use and general plan designations. Collectively, this information provides context to the analysis of agricultural and land use impacts presented in Section 16.2. The data used to characterize existing land uses conditions in the Project area come from a variety of State and local sources as cited throughout the text.

16.1.1 Land Ownership

Land ownership in the Project area has been classified into three broad categories: public, private, and public trust (see Figure 16-1 and Table 16-1). Most of the land in the Project area (5,235 acres, or about 89 percent the Project area) is held in private ownership. The remaining land is either administered by various public agencies (377 acres, 6.4 percent) or is public trust land administered by the California State Lands Commission (CSLC) (191 acres, 3.2 percent). Public lands under the jurisdiction of the CSLC include both fee lands owned by the State and an easement interest in lands which are held in public trust.

As general background, the State of California acquired sovereign ownership of all tidelands and submerged lands and the beds of navigable waterways upon its admission to the United States in 1850. On navigable non-tidal waterways, such as the San Joaquin River, the State, acting by and through CSLC, holds fee ownership of the bed of the river landward to the ordinary low water mark and a public trust easement landward to the ordinary high water mark, except where there has been fill or artificial accretions or the boundary has been fixed by agreement or court decision. Such boundaries may not be readily apparent from present day site inspections. Whereas fee title in the bed of the river between the low water and high water marks is commonly held in private ownership, it remains subject to the public trust and the jurisdiction of CSLC. Private parties may not use the public trust easement area exclusively and uses within the

easement area must be consistent with common law public trust uses including commerce, navigation, fisheries, recreation, scientific study and the preservation of open space.

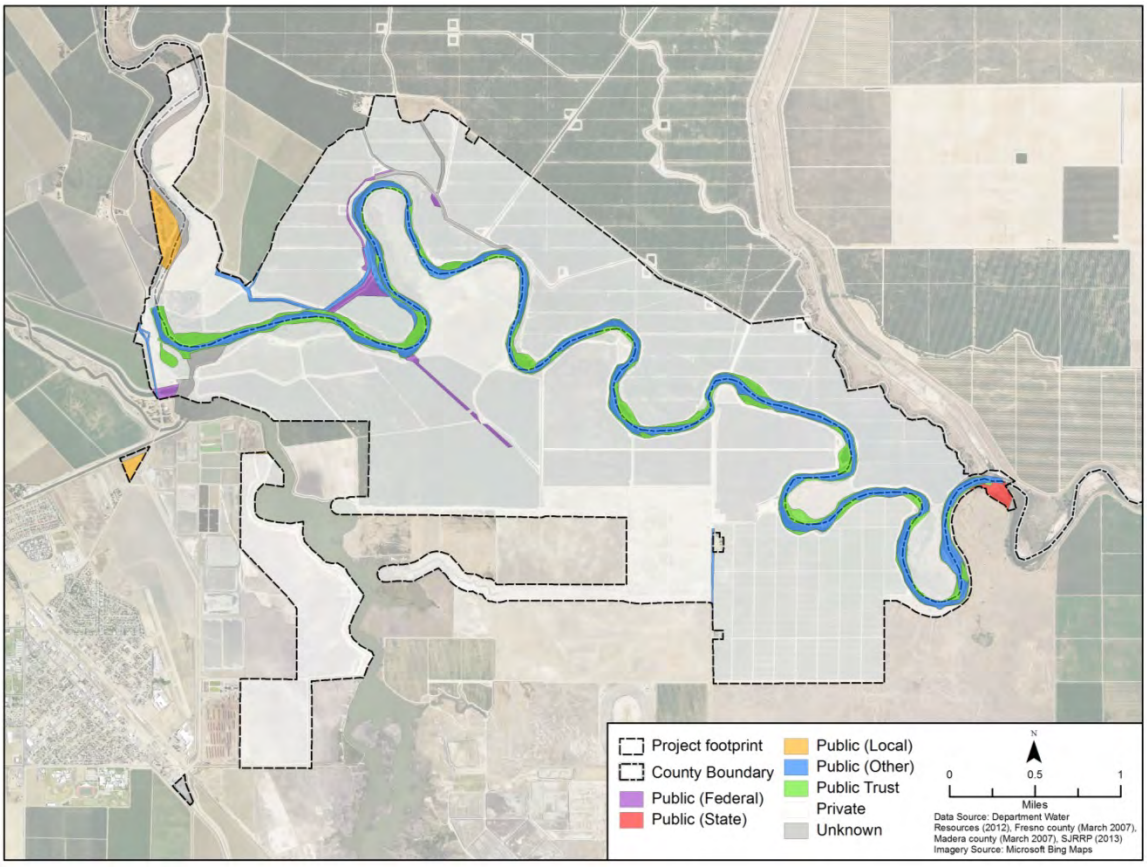

Figure 16-1.
Land Ownership in the Project Area

Table 16-1.
Land Ownership

Ownership	Acres	Percent (%)
Public	377	6.4
Federal	33	0.6
State	10	0.2
Local	37	0.6
Other	297	5.0
Private	5,235	88.8
Public Trust	191	3.2
Unknown	91	1.5
Total	**5,894**	**100.0**

Source: SJRRP 2011a, updated for this document

The extent of the CSLC's jurisdiction within the Project area is depicted on the Administrative Map for Reach 2B, which were developed at Reclamation's request in connection with the Project (CSLC 2011). A Record of Survey was filed for the San Joaquin River Administrative Map Reach 2B in both the Fresno and Madera County Recorder's Offices, respectively.

16.1.2 Land Use

Generally, the Project area is rural with most of the land along the river in agricultural production. For this analysis, land uses in the Project area have been classified into four general land use categories: (1) agricultural, (2) open space and undeveloped, (3) urban, and (4) water.[1] As shown in Figure 16-2 and Table 16-2, land use in Reach 2B is predominantly agricultural (4,227 acres, or 72 percent of the Project area) followed by open space and undeveloped land (1,242 acres, 21 percent), water (360 acres, 6.1 percent), and urban (14 acres, 0.2 percent). Additional information on cropping patterns is presented in Section 16.1.3. Although the extent of urban uses in the Project area is limited, the city of Mendota is located just west of the downstream portion of the Project area and several public roadways, including Bass Avenue and San Mateo Avenue travel through the area. Population in the city of Mendota was 11,167 in 2012 (California Department of Finance 2012).

16.1.3 Agricultural Production

The Project area is located within the San Joaquin Valley, a highly productive agricultural region in California. The region produces a wide variety of agricultural products, including, but not limited to, field crops, fruits, seed crops, tree nuts, and vegetables. The value of agricultural production in the region is substantial; refer to Chapter 21.0, "Socioeconomics and Economics" for more information on agricultural production values.

Cropping Patterns

Agriculture is the primary land use in the Project area and represents a key industry in the local and regional economy. Information on local cropping patterns was compiled for the Project area based on site surveys, California Department of Water Resources (DWR) land use data, and interviews with local landowners. Local agricultural production was classified into eight crop categories: alfalfa, almonds, cotton, grapes, grazing, other row crop, palms, and pistachios; vacant agricultural land was also identified. Existing cropping patterns in the Project area are presented in Figure 16-3 and Table 16-3.

Almonds are the largest single crop grown in the Project area, accounting for 45 percent of total agricultural acreage. The production of grapes (14 percent), other row crops (15 percent), and pistachios (12 percent) also represent important crops grown in the Project area. Approximately 10 percent of agricultural land in the Project area was not in active

[1] The land use data contain multiple categories that were aggregated as follows: Agricultural (citrus and subtropical; deciduous fruits and nuts; field crops; grain and hay crops; pasture; semi-agricultural and incidental to agriculture; truck, nursery and berry crops; and vineyards); Open Space and Undeveloped (idle, native vegetation, riparian vegetation, and vacant); Urban (industrial and urban); and Water (water surface). Some lands within the Project area were not surveyed with respect to current land use.

production. Based on cropping patterns, it is evident that local growers predominantly produce relatively higher-value permanent crops, namely nut crops.

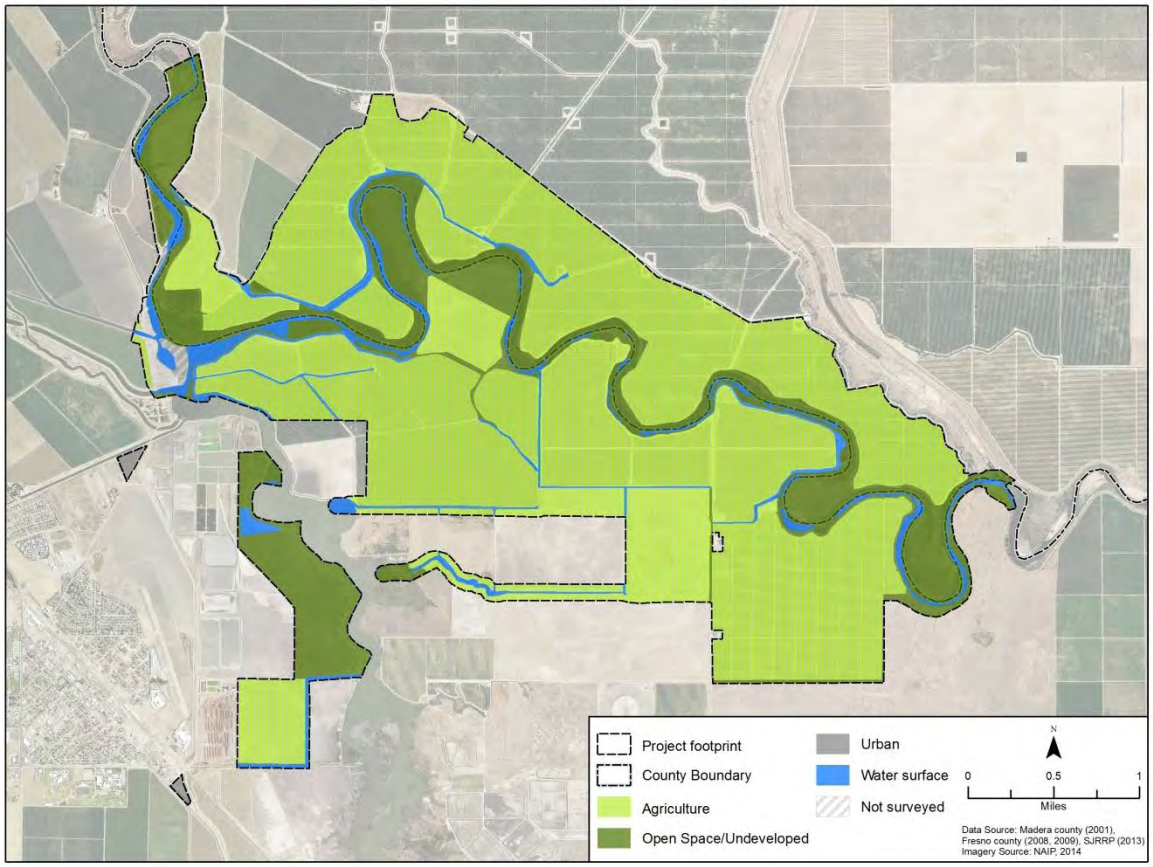

Figure 16-2.
Existing Land Use in the Project Area

Table 16-2.
Existing Land Use

Land Use	Acres	Percent (%)
Agriculture	4,227	71.7
Open Space / Undeveloped	1,242	21.1
Urban	14	0.2
Water	360	6.1
Not Surveyed	51	0.9
Total	**5,894**	**100.0**

Source: SJRRP 2012a,updated for this document

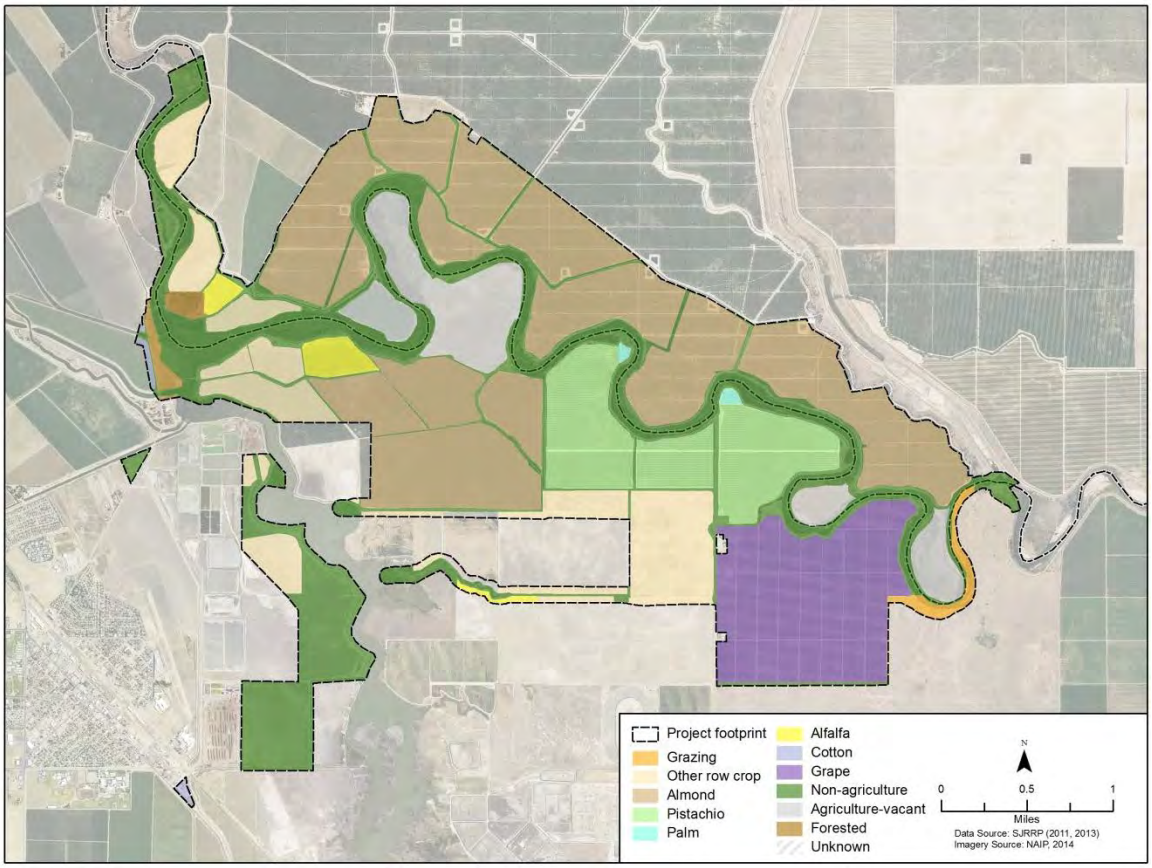

Figure 16-3.
Cropping Patterns in the Project Area

Table 16-3.
Cropping Patterns

Crop Type	Acres	Percent (%)
Alfalfa	80	1.8
Almonds	1,969	45.3
Cotton	15	0.3
Grapes	623	14.3
Grazing	42	1.0
Other row crop	655	15.1
Palm	10	0.2
Pistachios	519	11.9
Agriculture-Vacant	431	9.9
Total	**4,344**	**100.0**

Source: SJRRP 2012a updated for this document

Farmland Designations

The DOC, as part of its Farmland Mapping and Monitoring Program (FMMP), classifies land across the State into a range of agricultural land use categories based on technical soil ratings and current land use. This information is used to develop "Important Farmland" maps and track agricultural trends in the State. Below is a description of the FMMP mapping categories, which are defined, in part, by information from the U.S. Department of Agriculture. For more information on the FMMP, refer to Section 16.2.2.

- **Prime Farmland:** The best combination of physical and chemical features able to sustain long-term agricultural production.
- **Farmland of Statewide Importance:** Similar to Prime but with minor shortcomings such as greater slopes or less ability to store soil moisture.
- **Unique Farmland:** Farmland of lesser quality soils used for production of the State's leading agricultural crops.
- **Farmland of Local Importance:** Land of importance to the local agricultural economy as determined by each county's board of supervisors or local advisory committee.
- **Grazing Land:** Land with existing vegetation suited for livestock grazing.
- **Urban and Built-up Land:** Land occupied by structures used for residential, industrial, commercial, institutional, transportation yards, cemeteries, airports, golf courses, landfills, water or sewer treatment, or other developed purposes.
- **Other Land:** Land not included in any other mapping category. Often including low-density rural developments with brush, timber, or wetlands that are not suitable for livestock. This category includes strip mines, borrow pits, small bodies of water, and vacant and nonagricultural land surrounded on all sides by urban development.
- **Water:** Perennial bodies of water that are 40 acres or larger.

Figure 16-4 and Table 16-4 present the distribution of Important Farmland categories across the Project area. Most of the land in Reach 2B is considered designated Farmland[2] (about 76 percent of the Project area). Approximately 3,422 acres (58 percent) is considered Prime Farmland; 802 acres (14 percent) is Farmland of Statewide Importance; and 190 acres (3.2 percent) is Unique Farmland. In addition, Farmland of Local Importance accounts for approximately 565 acres (or 9.6 percent) in the Project area.

[2] Land considered "designated Farmland" consists of three farmland categories: Prime Farmland, Farmland of Statewide Importance, and Unique Farmland.

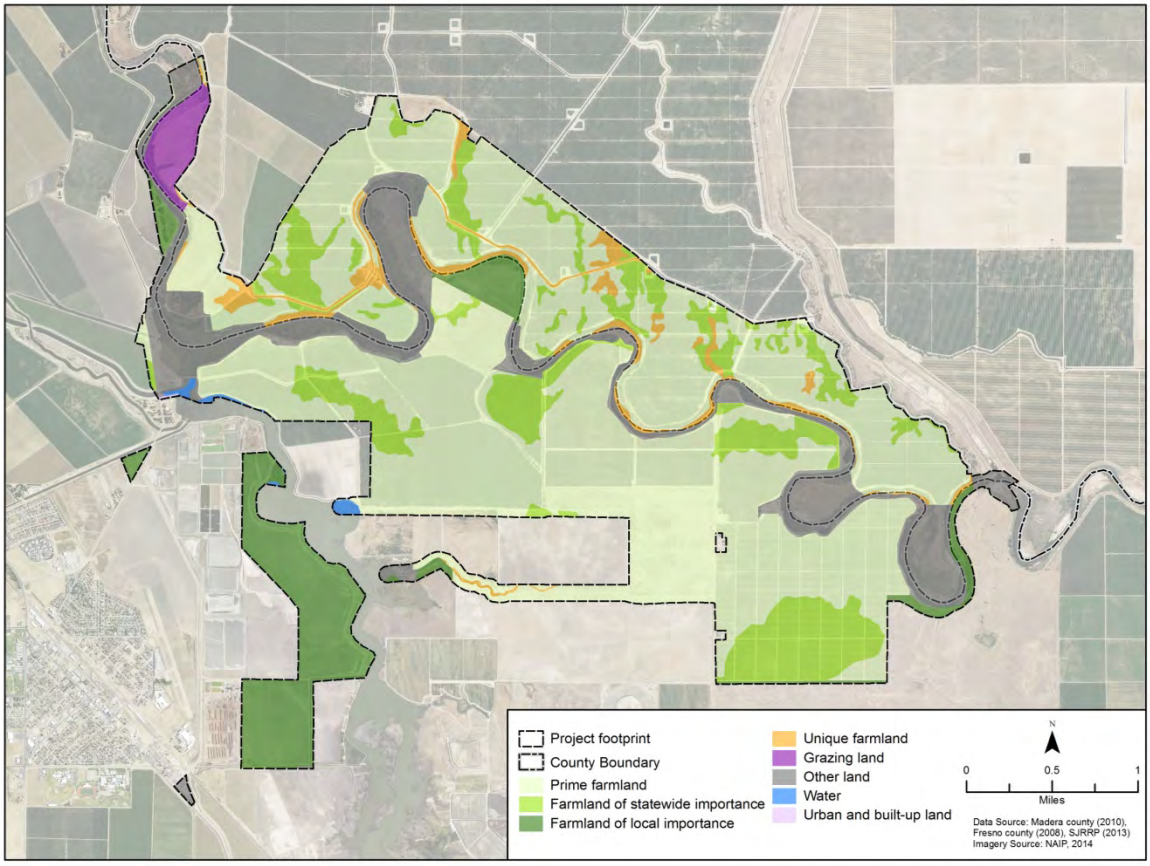

Figure 16-4.
Important Farmland in the Project Area

Table 16-4.
Important Farmland

Farmland Category	Acres	Percent (%)
Prime Farmland	3,422	58.1
Farmland of Statewide Importance	802	13.6
Unique Farmland	190	3.2
Farmland of Local Importance	565	9.6
Grazing Land	86	1.5
Urban and Built-Up Land	1	0.0
Other Land	807	13.7
Water	20	0.3
Total	**5,894**	**100.0**

Source: DOC 2010a

Williamson Act

Some agricultural lands in California are protected under the California Land Conservation Act, commonly called the Williamson Act. (For more information on the Williamson Act, refer to Section 16.2.2.) Across California, approximately 15 million acres were enrolled in Williamson Act contracts in 2009 (DOC 2010b). At the local level, much of the farmland in Fresno and Madera counties is under Williamson Act contracts. Specifically, over 2.0 million acres were enrolled in Williamson Act contracts in the two-county region in 2009, which represent nearly 14 percent of the statewide total. Similarly, agricultural land in the Project area also tends to be covered under the Williamson Act. As shown in Figure 16-5 and Table 16-5, approximately 76 percent of lands (4,508 acres) within the Project area are under Williamson Act contract.

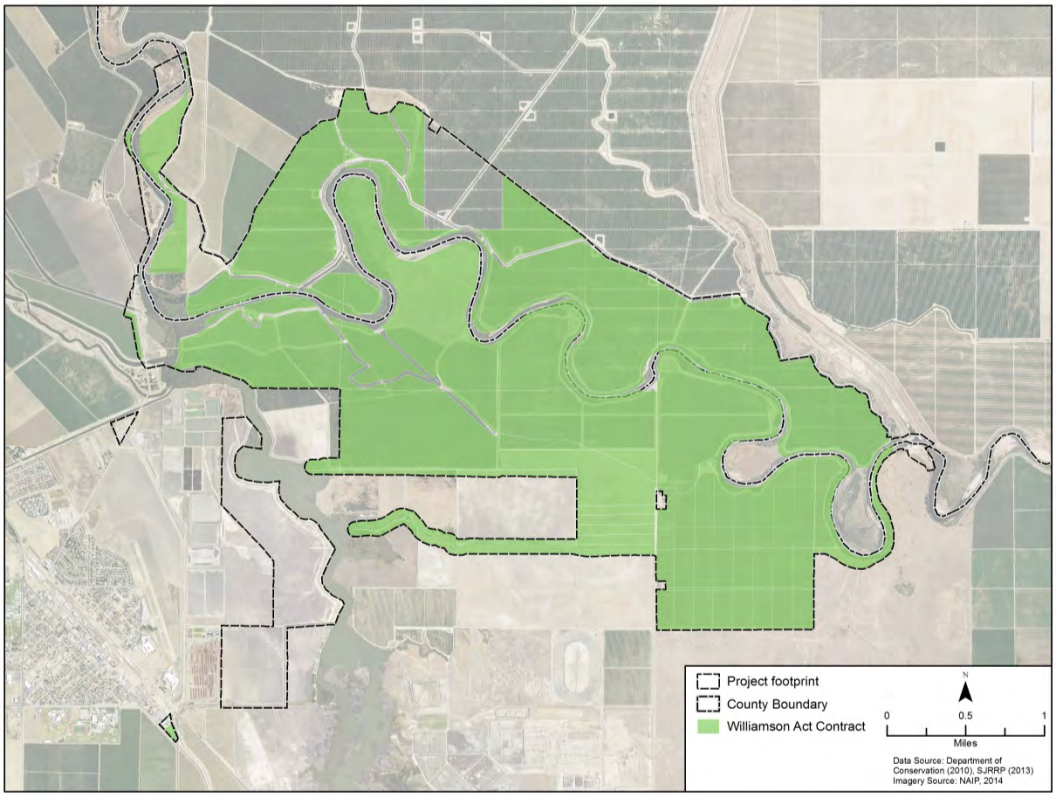

Figure 16-5.
Lands under Williamson Act Contract

Table 16-5.
Lands under Williamson Act Contract

Type	Acres	Percent (%)
Williamson Act Contract	4,508	76.5
Not Under Williamson Act Contract	1,386	23.5
Total	**5,894**	**100.0**

Source: DOC 2010a

16.1.4 Land Use Planning

Land use planning in the Project area is implemented by local governments, namely Fresno and Madera counties. Land use planning is dictated by applicable zoning regulations and general plans. Zoning ordinances govern current land use, including allowable land uses, intensity of use, and property development standards, while general plans provide the framework for future land use with a typical planning horizon of 15 to 25 years. For this analysis, various land use designations, as defined in the Fresno and Madera counties' general plans, were combined into common classifications. These designations reflect each county's vision of ultimate future land uses for the region. As presented in Figure 16-6 and Table 16-6, future land use in the Project area is planned to remain predominantly in agricultural production, with nearly 99 percent of the land area being designated for agricultural use. A relatively small portion of the Project area, approximately 1.3 percent, is designated for urban use by the local planning authorities, which consists of various residential, commercial, and industrial uses.

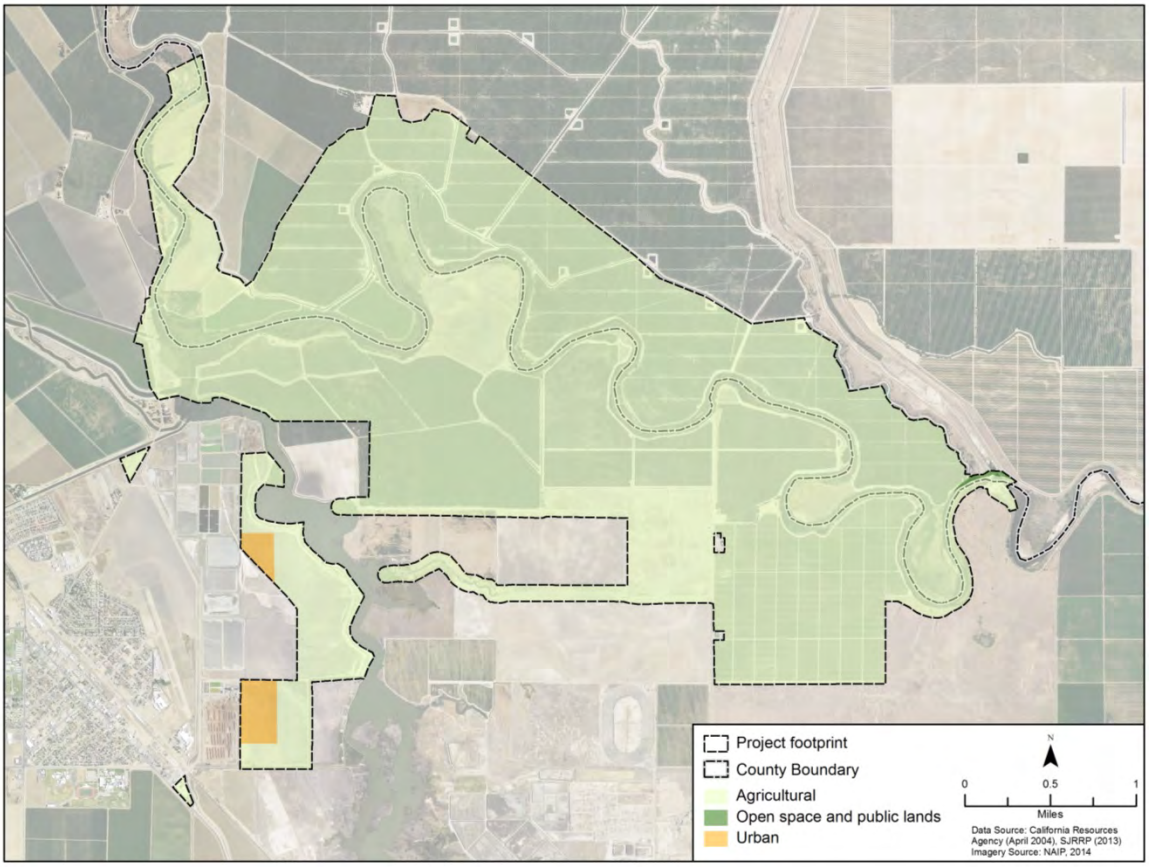

Figure 16-6.
General Plan Land Use Designations

Table 16-6.
General Plan Land Use Designations

Type	Acres	Percent (%)
Agriculture	5,814	98.6
Urban	75	1.3
Open Space / Public lands	5	0.1
Total	**5,894**	**100.0**

Source: California Resources Agency 2004, Fresno County 2013

16.2 Regulatory Setting

The regulatory setting for land use and agricultural resources includes Federal, State, and local/regional regulations. Portions of the information presented below have been excerpted from the San Joaquin River Restoration Program (SJRRP) Program Environmental Impact Statement/Report (PEIS/R).

16.2.1 Federal

Farmland Protection Policy Act of 1981

The Farmland Protection Policy Act is intended to minimize the impact of Federal programs with respect to the conversion of farmland to nonagricultural uses. It ensures that, to the extent possible, Federal programs are administered to be compatible with State, local, and private programs and policies to protect farmland. The National Resources Conservation Service (NRCS) is the agency primarily responsible for implementing the Farmland Protection Policy Act.

The Farmland Protection Policy Act established the Farmland Protection Program and the Land Evaluation and Site Assessment (LESA) system. The NRCS administers the Farmland Protection Program, which is a voluntary program that helps purchase development rights to keep productive farmland in agricultural uses. The program provides matching funds to State, local, and tribal government entities and nongovernmental organizations with existing Farmland Protection Programs to purchase conservation easements. Participating landowners agree not to convert land to nonagricultural uses, and retain all rights to the property for future agriculture. A minimum 30-year term is required for conservation easements, and priority is given to applications with perpetual easements (NRCS 2013a). The LESA system is a tool used to rank lands for suitability and inclusion in the Farmland Protection Program. Land evaluations involve rating soils and placing them into groups ranging from the best to the least suited for a specific agricultural use, such as cropland, forestland, or rangeland. Site assessments involve three major areas: nonsoil factors related to agricultural use of a site, factors related to development pressures, and other public values of a site. Each factor selected is assigned a range of possible values according to local needs and objectives (NRCS 2013b).

16.2.2 State of California

The Public Trust Doctrine

The origins of the Public Trust Doctrine are traceable to Roman law concepts of common property. Under Roman law, the air, the rivers, the sea, and the seashore were incapable of private ownership; they were dedicated to the use of the public (Institutes of Justinian 2.1.1). Under English Common Law, this principle evolved into the Public Trust Doctrine pursuant to which the sovereign held the navigable waterways and submerged lands, not in a proprietary capacity, but as a "trustee of a public trust for the benefit of the people" (*Colberg, Inc. v. State of California ex rel. Dept. Pub. Works*, 67 Cal.2d 408, 416 [1967]).

Upon admission to the Union in 1850, California, as a sovereign state, received fee title to tide and submerged lands, as well as, the lands underlying navigable waterways (collectively referred to as "public trust lands") under the equal-footing doctrine (*Martin v. Waddell*, 41 U.S. 367, 410 [1842]). The Public Trust Doctrine, as a common law doctrine, is not static but is continuously evolving. Pursuant to the Public Trust Doctrine, public trust lands are owned by the State and held in trust for the benefit of the public. Public trust lands are not alienable in that all of the public's interest in them cannot be extinguished (*People v. California Fish Co.*, 166 Cal. 576, 597-99 [1913]; *Illinois Central v. Illinois*, 146 U.S. 387 [1892]; Cal. Const. Article X, Section 4; Pub. Resources Code, § 7991). Public trust lands cannot be bought and sold like other State-owned lands; only in rare cases may the public trust be terminated, and only where consistent with the purposes and needs of the trust (city of Long Beach v. Mansell, 3 Cal. 3d 462 [1970]). These lands are to be used to promote the public's interest in water dependent or water oriented activities including, but not limited to, water-related commerce, navigation, fisheries, environmental preservation and recreation.

The California Legislature, representing the people of California, is the ultimate trustee of California's public trust lands and resources and exercises its authority and responsibility to enact laws to protect and promote prudent use of public trust lands and the living resources therein. *National Audubon Society v. Superior Court*, 33 Cal. 3d 419 (1983) states that the core of the Public Trust Doctrine is the State's authority as sovereign to exercise a continuous supervision and control over the waters of the state to protect ecological and recreational values. The Legislature has delegated to the CSLC exclusive control and jurisdiction over ungranted public trust lands. (Pub. Resources Code, §§ 6216, 6301). The CSLC implements the Public Trust Doctrine through careful consideration of its principles and the exercise of discretion within the specific context and location of proposed uses. In administering its trust responsibilities, the CSLC exercises its discretionary authority in the best interests of the State, accommodating the changing needs of the public while preserving the public's right to use public trust lands for the purposes to which they are uniquely suited.

Use of public trust lands is generally limited to water dependent or related uses, including commerce, fisheries, and navigation, environmental preservation and recreation. Public trust uses include, among others, ports, marinas, docks and wharves, buoys, hunting, commercial and sport fishing, bathing, swimming, and boating. Ancillary or incidental

uses – those that directly promote trust use, are directly supportive and necessary for trust use, or that accommodate the public's enjoyment of trust lands – are also permitted. Public trust lands may also be kept in their natural state for habitat, wildlife refuges, scientific study, or use as open space (*Marks v. Whitney*, 6 Cal 3d 251 [1971]). Because public trust lands are held in trust for all citizens of California, they must be used to serve statewide goals, as opposed to purposes that are purely of local benefit (*Mallon v. City of Long Beach*, 44 Cal.2d 199 [1955]; Pub. Resources Code, § 6009). In addition, the living resources (e.g., the fish and aquatic plant and animal life) inhabiting public trust lands and the overlying waters are public trust resources and also subject to the protections of the Public Trust Doctrine.

State Planning and Zoning Laws

California Government Code section 65300 et seq. establishes the obligation of cities and counties to adopt and implement general plans. A general plan is a comprehensive, long-term strategy document that sets forth the expected location and general type of physical development expected in the city or county developing the document. The plan also may consider land outside its boundaries that, in the city's or county's judgment, may affect land use activities within its borders. The general plan addresses a broad range of topics, including, at a minimum, land use, circulation, housing, conservation, open space, noise, and safety. In addressing these topics, the general plan identifies the goals, objectives, policies, principles, standards, and plan proposals that support the city's or county's vision for the area. The general plan is a long-range document that typically addresses development over a 20-year period. Although the general plan serves as a blueprint for future development and identifies the overall vision for the planning area, it remains general enough to allow flexibility in the approach taken to achieve the plan's goals.

The State Zoning Law (Gov. Code, § 65800 et seq.) establishes that zoning ordinances, which are laws that define allowable land uses in a specific district, are required to be consistent with the general plan and any applicable specific plans. When amendments to the general plan are made, corresponding changes in the zoning ordinance may be required within a reasonable time to ensure that the land uses designated in the general plan also would be allowable by the zoning ordinance (Gov. Code, § 65860, subd. (c)).

Williamson Act

The California Land Conservation Act of 1965, commonly known as the Williamson Act, was enacted when population growth and rising property taxes were recognized as a threat to the viability of valuable farmland in California. It enables local governments to enter into contracts with private landowners to promote the continued use of relevant land in agricultural or related open space use. In return, landowners receive property tax assessments that are based on farming and open space uses instead of full market value. Local governments receive an annual subvention (subsidy) of forgone property tax revenues from the State via the Open Space Subvention Act of 1971.

The Williamson Act empowers local governments to establish "agricultural preserves" consisting of lands devoted to agricultural and other compatible uses. After such preserves are established, the locality may offer to owners of included agricultural land the opportunity to enter into annually renewable contracts that restrict the land to

agricultural use for at least 10 years (i.e., the contract continues to run for 10 years following the first date on which the contract is not renewed). In return, the landowner is guaranteed a relatively stable tax rate, based on the value of the land for agricultural/open space use only, and is unaffected by its development potential.

Contracts can be terminated only by a cancellation or nonrenewal. Cancellation of a Williamson Act contract involves an extensive review and approval process, in addition to payment of fees of up to 12.5 percent of the property value. The local jurisdiction approving the cancellation must find that the cancellation is consistent with the purpose of the California Land Conservation Act or is in the public interest. Several subfindings must be made to support either finding, as defined in Government Code section 51282. However, the Project may not require any cancellation procedure besides notification, because the land is needed by a public agency for a public use, as described in Government Code section 51291. This issue is described in the Project's *Technical Memorandum on Regulatory Compliance* (SJRRP 2011b) and Chapter 27, "Consultation, Coordination, and Compliance."

Filing for a nonrenewal, which can be done unilaterally by either the property owner or the local government, initiates a gradual increase in the property tax rate over the 10-year renewal period until it reaches the market rate by the end of the term. During the nonrenewal period, the property continues to be limited to uses allowed by the Williamson Act.

Farmland Security Zones

In August 1998, the legislature enhanced the Williamson Act with the Farmland Security Zone provisions. Farmland Security Zones, also known as Super Williamson Act lands, were established by the DOC with the same intent as Williamson Act contracts. The Farmland Security Zone provisions offer landowners greater property tax reductions in return for a minimum rolling contract term of 20 years. A Farmland Security Zone must be located in an Agricultural Preserve (area designated as eligible for a Williamson Act contract) and designated as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance. Land protected in a Farmland Security Zone cannot be annexed by a city or county government or school district. Farmland Security Zone contracts constitute nearly 2 percent of statewide Williamson Act enrollment (DOC 2007a).

A Farmland Security Zone can be terminated through a nonrenewal or cancellation. The nonrenewal allows a rollout process to occur over the remainder of the term of the contract, when the tax rates would gradually rise to the full rate by the end of the 20-year term. A cancellation must be applied for and approved by the director of the DOC, and specific criteria must be met. The cancellation must be in the public interest and consistent with Williamson Act criteria. If a cancellation is approved, fees equal to 25 percent of the full market value of the property must be paid (DOC 2007a).

California Important Farmland Inventory System and Farmland Mapping and Monitoring Program

The DOC maintains a statewide inventory of farmlands. These lands are mapped by the Division of Land Resource Protection as part of the FMMP. The FMMP was established by the State in 1982 to continue the Important Farmland mapping efforts begun in 1975 by the U.S. Soil Conservation Service (now called the NRCS). The intent of the NRCS was to produce agricultural resource maps based on soil quality and land use across the nation. The maps are updated every 2 years with the use of aerial photographs, a computer mapping system, public review, and field reconnaissance. As part of the nationwide effort to map agricultural land uses, the NRCS developed a series of definitions known as Land Inventory and Monitoring criteria. The Land Inventory and Monitoring criteria classify land's suitability for agricultural production. Suitability includes both physical and chemical characteristics of soils, as well as the actual land use. Maps of Important Farmland are derived from NRCS soil survey maps using the Land Inventory and Monitoring criteria and are available by county (DOC 2007b).

California Farmland Conservancy Program

The California Farmland Conservancy Program is a statewide grant funding program that supports local efforts to establish agricultural conservation easements and planning projects for the purpose of preserving important agricultural land resources (DOC 2007c). The California Farmland Conservancy Program provides grants to local governments and qualified nonprofit organizations for the following (DOC 2007d):

- Voluntary acquisition of conservation easements on agricultural lands that are under pressure of being converted to nonagricultural uses.
- Temporary purchase of agricultural lands that are under pressure of being converted to nonagricultural uses, as a phase in the process of placing agricultural conservation easements on farmland.
- Agricultural land conservation policy and planning projects.
- Restoration of and improvements to agricultural land already under easement.

Land Evaluation and Site Assessment Model (California)

Based on the Federal LESA system, the California LESA model was developed in 1997 to provide lead agencies with an optional methodology to ensure that potentially significant effects on the environment of agricultural land conversions are quantitatively and consistently considered in the environmental review process, including California Environmental Quality Act (CEQA) reviews. The California Agricultural LESA model evaluates measures of soil resource quality, a given project's size, water resource availability, surrounding agricultural lands, and surrounding protected resource lands. For a given project, the factors are rated, weighted, and combined, resulting in a single numeric score. The project score becomes the basis for determining a project's potential significance (DOC 1997).

16.2.3 Regional and Local

Regional and local regulations pertaining to land use and agricultural resources are based on allowable uses and policies outlined in local zoning and general plans implemented by Fresno and Madera counties.

Zoning

Zoning regulates the location of land uses and the development standards to which new development must be built. The purposes of establishing zoning designations are to ensure that neighboring land uses are compatible with one another and to regulate and protect the uses in which land may be placed. Each zoning designation contains specific regulations controlling the uses of land; density of population/structures; use, location, and dimensions of structures; open space/setback requirements; and access considerations.

Both Fresno and Madera counties implement their own set of zoning regulations. These regulations are applied when land is initially developed or redeveloped through permitting requirements. Based on existing land uses, it is assumed that zoning on most parcels in the Project area is “agricultural” in nature. Generally, agricultural zoning is designed to support and enhance agriculture land use and open spaces. The general descriptions of agricultural zoning designations in the two-county region are summarized below.

Agricultural zoning designations in Fresno County that are likely to be applicable to most land in the Project area include the following (Fresno County 2004):

- The **"AE" District** is intended to be an exclusive district for agriculture and for those uses which are necessary and an integral part of the agricultural operation. This district is intended to protect the general welfare of the agricultural community from encroachments of nonrelated agricultural uses which by their nature would be injurious to the physical and economic well-being of the agricultural district.
- The **"AL" District** is a limited agricultural district. It is intended to protect the general welfare of the agricultural community by limiting intensive uses in agricultural areas where such uses may be incompatible with, or injurious to, other less intensive agricultural operations. The district is also intended to reserve and hold certain lands for future urban use by permitting limited agriculture and by regulating those more intensive agricultural uses which, by their nature, may be injurious to nonagricultural uses in the vicinity or inconsistent with the express purpose of reservation for future urban use.

Agricultural zoning designations in Madera County include the following which focus on lot size (Madera County 2015):

- AR-5 Agricultural, Rural, Five Acre District..
- ARE-20 Agricultural Rural, Exclusive Twenty Acre District.
- AEX-20 Agricultural Exclusive, Twenty Acre District.

- ARE-40 Agricultural Rural, Exclusive Forty Acre District.
- AEX-40 Agricultural, Exclusive Forty Acre District.
- ARE-80, 160, 320, 640 Agricultural, Rural, Exclusive, 80 to 640 Acre District.
- ARV-20 Agricultural, Rural, Valley, Twenty Acre District.
- ARF Agricultural, Rural, Foothills District.

General Plans

As described above, each county and city in the state is required by Government Code section 65300 to have a comprehensive, long-term general plan for the physical development of the county or city. This section summarizes key features related to agriculture and open space in the general plans developed for Fresno and Madera counties. Representative general plan land use designations applicable to the Project area are presented in Section 16.1.4. These land use designations are implemented mainly through the local zoning ordinances referenced above.

Fresno County General Plan

The Fresno County General Plan was adopted in 2000 and is in the process of being updated. The two primary components of the General Plan that are applicable to the Project are the *Agriculture and Land Use Element* and *Open Space and Conservation Element*. Generally, general plan policies applicable within Fresno County are focused on maintaining the long-term viability of agriculture in the region (Fresno County 2000).

Madera County General Plan

The Madera County General Plan Policy Document, adopted in October 1995, is a stand-alone document that is part of the Madera County General Plan. Key general policies related to the protection of agriculture in Madera County are covered under the *Agriculture and Natural Resource* section of the plan (Madera County 1995).

16.3 Environmental Consequences and Mitigation Measures

16.3.1 Impact Assessment Methodology

The focus of this section is on physical changes in existing land use patterns in the Project area including agriculture, and secondarily, the consistency of the Project with local and regional land use plans and programs in Fresno and Madera counties.

To evaluate potential impacts on agricultural resources, the proposed footprint of the Project construction activities and long-term operational scenarios was evaluated in the context of existing agricultural operations to determine the extent (in acres) to which agricultural lands would be permanently removed from production. This evaluation was based on spatial overlays of the Project features (including borrow areas) on existing land use maps developed for the Project using Geographic Information System (GIS) analysis. In addition, the agricultural impact analysis also considered information on cropping patterns and representative crop yields to fully evaluate the magnitude of impacts on

agricultural values, which are evaluated in the Chapter 21.0, "Socioeconomics and Economics."

The groundwater resource analysis of potential seepage and high water table impacts was used to determine the extent of agricultural lands not proposed to be removed from production that could be affected in terms of agricultural productivity. This impact is evaluated qualitatively.

The assessment of agricultural resources also considered impacts related to conversion of designated Farmland (under the FMMP) to non-agricultural uses, as well as conflicts with Williamson Act contracts. This analysis evaluates the extent to which designated Farmland and properties under Williamson Act contract would be affected by the Project footprint using GIS analysis.

From a planning perspective, the Project is also evaluated with respect to its consistency with local general plans administered by Fresno and Madera counties. These plans have been reviewed in the context of Project activities to focus only on those sections that are relevant to the Project, including proposed land uses in the Project area, as well as policies related to open space preservation, conservation, and agriculture.

16.3.2 Significance Criteria

The Project was evaluated in accordance with the agricultural resources and land use and planning sections of the Environmental Checklist Form in Appendix G of the State CEQA Guidelines, as amended. Under National Environmental Policy Act (NEPA) Council on Environmental Quality Regulations, effects are evaluated in terms of their context and intensity. These factors have been considered when applying the State CEQA Guidelines. The Project would result in a significant impact on land use and agriculture if it would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Natural Resources Agency, to non-agricultural use.
- Conflict with existing zoning for agricultural use or a Williamson Act contract.
- Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Pub. Resources Code, § 12220, subd. (g)), timberland (as defined in Pub. Resources Code, § 4526), or timberland zoned Timberland Production (as defined in Pub. Resources Code, § 51104, subd. (g)).
- Result in the loss of forest land or conversion of forest land to non-forest use.
- Involve other changes in the existing environment that, because of their location or nature, could result in conversion of Important Farmland to nonagricultural use or the substantial diminishment of agricultural land resource quality or importance.
- Physically divide an established community.

- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.
- Conflict with any applicable habitat conservation plan or natural community conservation plan.

16.3.3 Impacts and Mitigation Measures

This section provides an evaluation of the direct and indirect effects of the Project Alternatives on agricultural and other land uses in the Project area. It includes analyses of potential effects relative to No-Action conditions in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. The analysis is organized by Project alternative with specific impact topics numbered sequentially under each alternative. With respect to agricultural and land use, the environmental impact topics are:

1. Removal of Land from Agricultural Production.
2. Conversion of Designated Farmland to Non-Agricultural Uses.
3. Conflict with Williamson Act Contracts.
4. Degradation of Agricultural Land Productivity due to Seepage.
5. Conflict with Applicable Land Use Plans Regarding Agricultural Lands.
6. Diminishment of Agricultural Production by Increased Disease.

Other agriculture and land use-related issues covered in the PEIS/R are not covered here because they are programmatic in nature and/or are not relevant to the Project area. These include conversion of riparian forest to non-forest uses; physically divide or disrupt an established community; potential conversion of riparian forest because of altered inundation; and substantial diminishment of agricultural land resource quality and importance because of altered water deliveries. The issue of potential conflicts with habitat conservation plans is addressed in Chapter 7.0, “Biological Resources – Wildlife."

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. Existing levee alignments and heights would be maintained and maximum conveyance would be limited to the existing channel capacity. However, other proposed actions under the SJRRP would be implemented, including habitat restoration in other reaches, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, Program-level activities would not achieve the Settlement goals. For the No-Action Alternative, the analysis of effects related to agricultural resources and land use is based on a comparison to existing conditions. No mitigation is required for No-Action.

Impact LU-1 (No-Action Alternative): ***Removal of Land from Agricultural Production***. Under the No-Action Alternative, the Project would not be implemented;

therefore, there would be no direct effects on agricultural production in the Project area associated with habitat restoration activities and/or construction and operation of new facilities. However, program-wide restoration activities would still be implemented, including Restoration Flows in the San Joaquin River. In Reach 2B, Restoration Flows would not exceed channel capacity and flood flows would be contained within the existing river channel or diverted into the Chowchilla Bypass when flood releases approach channel capacity, thereby avoiding direct effects on agricultural production in the Project area. (Indirect effects from seepage are described below under Impact LU-4.) Further, it is unlikely that agricultural land would be developed to accommodate potential population growth based on implementation of program-wide restoration activities in adjacent reaches of the river, which would discourage urban development in the region. Compared to existing conditions, no lands would be removed from production. There would be **no impact** associated with removing land from agricultural production under the No-Action Alternative.

Impact LU-2 (No-Action Alternative): ***Conversion of Designated Farmland to Non-Agricultural Uses***. Under the No-Action Alternative, there would be no direct effects on agricultural production in the Project area; refer to Impact LU-1 (No-Action Alternative) above. Accordingly, farmland designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance within the Project area would remain in agricultural production. Compared to existing conditions, there would be **no impact** associated with the conversion of designated Farmland to non-agricultural uses under the No-Action Alternative.

Impact LU-3 (No-Action Alternative): ***Conflict with Williamson Act Contracts***. Under the No-Action Alternative, there would be no direct effects on agricultural production in the Project area; refer to Impact LU-1 (No-Action Alternative) above. Therefore, agricultural lands in the Project area which are under Williamson Act contract would remain in active production and would remain in compliance with all contract provisions related to continued agricultural use. Compared to existing conditions, there would be **no impact** associated with conflicts with Williamson Act contracts under the No-Action Alternative.

Impact LU-4 (No-Action Alternative): ***Degradation of Agricultural Land Productivity due to Seepage***. Prior to the start of Interim Flows in October 2009, portions of the Project area historically experienced groundwater seepage to adjacent lands during elevated flood flows. Under the No-Action Alternative, Restoration Flows could affect agricultural lands in Reach 2B that have historically experienced groundwater seepage. Restoration flows could saturate areas for longer and more frequent periods, than flood flows under prior conditions. Restoration flows also could inundate areas during seasons when flood flows do not typically occur (i.e., summer and fall). These changes in duration, frequency, and seasonality could affect agricultural productivity by saturating soil in the rooting zone, impairing plant growth and survival, temporarily reducing grazing suitability, or interfering with the ability to use machinery to work soil. Most of these effects would be adverse and may necessitate changes in cropping patterns or grazing practices. At some sites, these adverse changes could cause agricultural land to be idled or otherwise reduce the land's quality and importance for agriculture. However,

Program-level seepage management measures would be implemented in the Project area that would minimize impacts to agricultural resources under the No-Action Alternative. Specifically, Restoration Flows would be managed such that the capacity of Reach 2B would not be exceeded. Consequently, adverse effects to agricultural productivity from Restoration Flows in Reach 2B would be minimized under the No-Action Alternative. Compared to existing conditions, there would be a **less-than-significant** impact related to the degradation of agricultural land productivity due to seepage of Restoration Flows under the No-Action Alternative.

Impact LU-5 (No-Action Alternative): ***Conflict with Applicable Land Use Plans Regarding Agricultural Lands***. Under the No-Action Alternative, there would be no direct change in existing agricultural or other land uses in the Project area. Although agricultural productivity may be affected due to seepage, the area would not be developed and would retain its agricultural character. As such, the No-Action Alternative would not conflict with applicable zoning regulations or general plan land use designations implemented by Fresno and Madera counties. Compared to existing conditions, there would be **no impact** related to conflicts with applicable land use plans in the Project area.

Impact LU-6 (No-Action Alternative): ***Diminishment of Agricultural Production by Increased Disease***. Under the No-Action Alternative, additional riparian vegetation upstream of the San Mateo Avenue crossing could affect the incidence of some orchard and vineyard diseases on adjacent land by serving as a source of causal organisms. However, the additional sources of causal organisms would not substantially reduce agricultural activity for several reasons: disease-causing organisms could already occur on a variety of widely planted fruit and nut crops present in the Project area, the incidence of disease is not solely or even primarily determined by the presence of causal organisms in the vicinity of an orchard or vineyard, and incidence of disease is only one of many factors affecting agricultural productivity. This impact would be **less than significant**.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

All of the Project alternatives, including Alternative A, propose habitat restoration activities in conjunction with an expanded floodplain and widened levee alignments, as well as new Project facilities that promote fish passage through Reach 2B. This alternative includes passive riparian habitat restoration and farming in the floodplain. Under Alternative A, agricultural uses that are suitable within the proposed floodplain would be allowed. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Impact LU-1 (Alternative A): ***Removal of Land from Agricultural Production***. Compared to No-Action, Alternative A would result in the removal of land from agricultural production in the Project area. As shown in Table 16-7, there are approximately 4,166 acres of land in agricultural production in the footprint of Alternative A. Of this total, about 1,232 acres would be subject to permanent loss of agricultural production, which includes the area underlying the proposed levee alignments and structures, borrow areas, and passive riparian habitat restoration areas within the floodplain. In addition, another 56 acres of farmland would be temporarily

disturbed during the 11-year construction period to accommodate features such as staging areas and access roads. Agricultural activity would be allowed on the floodplain within the proposed levee alignment (outside riparian habitat restoration areas) under Alternative A, up to 579 acres,[3] however, because this area would be subject to frequent inundation, it is likely that agricultural activity would primarily be livestock grazing, a relatively low-value type of agriculture use compared to permanent and annual crop production that generate higher economic returns. Agricultural production on the remaining farmland within Alternative A, roughly 2,299 acres, would not be affected.

Table 16-7.
Effects on Agricultural Land Uses

Type of Agricultural Effect	Alt. A (acres)	Alt. B (acres)	Alt. C (acres)	Alt. D (acres)
Permanent Agricultural Loss [a]	1,232	1,032	1,567	1,347
Temporary Agricultural Loss	56	42	73	69
Shift in Agricultural Land Use	579	886	0	956
No Agricultural Effect [b]	2,299	2,252	2,450	1,835
Total	***4,166***	***4,212***	***4,090***	***4,208***

Notes:

[a] Includes 350 acres of borrow area that are assumed to permanently removed from production.

[b] Includes land within potential borrow areas that are outside the required 350 acres of borrow pits.

Table 16-8 shows agricultural impacts by crop type. The Project would affect both permanent and annual crops, with the greatest impacts expected on almonds, which account for about 31 percent of the agricultural land that would be taken out of production permanently.[4] Other crops that would be taken out of production on a long-term basis include, but are not limited to, pistachios (15 percent), grapes (13 percent), row crops (13 percent), and vacant agricultural land (23 percent).

When comparing Alternative A to existing conditions, impacts to agricultural land uses would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). In summary, the Project would remove agricultural land from production over both the short term (i.e., during construction) and long term (i.e., into perpetuity) as lands are managed to meet the objectives and goals of the Settlement Agreement; this impact is considered **significant**.

[3] This is an assumed value that provides a maximum amount of agricultural activity on the floodplain while still allowing for riparian habitat restoration in the Project area.

[4] These values account for both the permanent loss and the shift in agricultural activity for each type of crop.

Table 16-8.
Agricultural Effects by Crop Type, Alternative A

Crop Type	Type of Effect			
	Permanent Loss (acres)	Temporary Loss (acres)	Shift in Agricultural Activity (acres)	No Effect (acres)
Alfalfa	36	3	12	29
Almonds	399	3	163	1,321
Cotton	2	0	0	5
Grapes	224	20	11	368
Grazing	41	0	0	1
Other Row Crop	200	8	35	332
Palm	8	0	2	0
Pistachio	124	20	145	230
Agriculture-Vacant	200	1	212	13
Total	**1,232**	**56**	**579**	**2,299**

Mitigation Measure LU-1 (Alternative A): ***Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*** Project proponents will recognize and minimize adverse effects on agricultural lands to the extent practicable, including modification of construction practices. The following activities would minimize adverse effects on existing agricultural land in production and limit the extent of farmland that would be converted to non-agricultural uses. However, this mitigation measure will not fully avoid the conversion of substantial amount of agricultural land to non-agricultural uses, and there are no additional measures to fully mitigate the loss of farmland; therefore, this impact would be **significant and unavoidable**.

Implementation Action: The following actions will be implemented opportunistically, where feasible, appropriate, and consistent with the purpose, need, and objectives of the Project. These following measures are summarized, in part, from the Record of Decision (ROD) for the San Joaquin Restoration Program (SJRRP 2012b):

- When selecting sites for borrow excavation, minimize the fragmentation of lands that are to remain in agricultural use and retain contiguous parcels of agricultural land of sufficient size to support their efficient use for continued agricultural production.
- Where the levee system would transect agricultural properties, and the landowners desire to continue agricultural use on the portions located within the levee system, provide a means of convenient access to these properties.

- The Project proponent will either (1) acquire agricultural conservation easements for designated Farmland/Important Farmland[5] at a 1:1 ratio to be held by land trusts or public agencies who will be responsible for enforcement of the deed restrictions maintaining these lands in agricultural use, or (2) provide funds to a land trust or government program that conserves agricultural land sufficient to obtain easements on comparable land at a 1:1 ratio.
- Stockpile the upper 2 feet of soil from Project structural feature footprints that are designated Farmland. Stockpiled soil would be used in subsequent restoration of agricultural uses or redistributed for agricultural purposes.
- Restore for agricultural uses in those portions of borrow sites and of levee, bypass, and other Project feature footprints that are designated Farmland and are not converted to Project features, managed habitat, or Project mitigation for nonagricultural impacts. Restoration for agricultural use would include redistribution of salvaged topsoil and earthwork for necessary irrigation and drainage.
- Redistribute the most productive salvaged topsoil from structural feature footprints that is not used in restoring agricultural uses to affected designated Farmland. Redistribution will be to less productive agricultural lands near but outside the levee setback and Mendota Pool. Bypass areas that could benefit from the introduction of good-quality soil. By agreement between U.S. Department of the Interior, Bureau of Reclamation (Reclamation) or landowners of affected properties and the recipient(s) of the topsoil, the recipient(s) must use the topsoil for agricultural purposes.
- Minimize disturbance of designated Farmland and continuing agricultural operations during construction by implementing the following measures: (1) locate construction laydown and staging areas on sites that are fallow, disturbed, or to be discontinued for use as agricultural land to the extent possible, and (2) use existing roads to access construction areas to the extent possible.
- Coordinate with growers to develop appropriate construction practices to minimize construction-related impairment of agricultural productivity. Practices may include coordinating the movement of heavy equipment within the levee setback and Mendota Pool Bypass areas and implementing traffic control measures outside these areas.
- Comply with California Government Code sections 51290–51295 with regard to acquiring lands under Williamson Act contract. Specifically, whenever it appears that land within a preserve or under contract may be required for a public improvement, the DOC and the city or county responsible for administering the preserve must be notified (§ 51291, subd. (b)). Within 30 days of being notified, the DOC and the city or county would forward

[5] The term “designated Farmland” used in this section is synonymous with “Important Farmland” as referenced in the ROD (DOC classifications: Prime Farmland, Unique Farmland, and Farmland of Statewide Importance).

comments, which would be considered by the Project proponents (§ 51291, subd. (b)). The Williamson Act contract would be terminated when the land is acquired (§ 51295). The DOC would be notified within 10 working days upon completion of the land acquisition (§ 51291, subd. (c)). If, after acquisition, the Project proponents determine that the property would not be used for the proposed public improvement, the DOC and the city or county administering the involved preserve will be notified before the land is returned to private ownership. The land would be reenrolled in a new contract or encumbered by an enforceable restriction at least as restrictive as that provided by the Williamson Act (§ 51295).

- The Project proponent will coordinate with landowners and agricultural operators to sustain existing agricultural operations, at the landowners' discretion, within the Project area until the individual agricultural parcels are needed for Project construction.

Location: Agricultural lands within the Project area.

Effectiveness Criteria: Effectiveness will be based on annual reporting of the number of acres removed from agricultural production during implementation.

Responsible Agency: Reclamation and CSLC.

Monitoring/Reporting Action: Adequacy of the proposed activities will be confirmed with Reclamation project managers and CSLC monitors.

Timing: Mitigation will be ongoing over the construction timeframe.

Impact LU-2 (Alternative A): ***Conversion of Designated Farmland to Non-Agricultural Uses***. Compared to No-Action, Alternative A would result in the conversion of designated Farmland in the Project area to non-agricultural uses (Table 16-9). For this analysis, Farmland under the FMMP covers land designated as Prime Farmland, Farmland of Statewide Importance, and Unique Farmland. Specifically, Alternative A would permanently remove 786 acres of Prime Farmland, 94 acres of Farmland of Statewide Importance, and 120 acres Unique Farmland from agricultural production to accommodate the proposed levees, floodplain restoration, and Project structures.[6] An additional 350 acres of land would be required for borrow material to support construction activities; the exact location of the borrow areas is not known, although they are likely to occur on designated Farmland, which comprises about 88 percent of potential borrow areas under Alternative A. During construction, another 65 acres of designated Farmland would be temporarily taken out of production, but could return to active agriculture once the Project is complete. Lastly, approximately 480 acres of designated Farmland is located within the proposed floodplain, which would be available for agricultural activity (likely livestock grazing).

[6] These assumed values provide a maximum amount of agricultural activity on the floodplain while still allowing for riparian habitat restoration in the Project area.

Table 16-9.
Conversion of Designated Farmland

Farmland	Alt. A (acres)	Alt. B (acres)	Alt. C (acres)	Alt. D (acres)
Permanent Loss of Designated Farmland [a]				
Prime Farmland	786	585	939	917
Farmland of Statewide Importance	94	86	163	112
Unique Farmland	120	114	116	113
Additional Farmland within the Floodplain [b]	≤480	≤786	--	≤862
Borrow Areas	≤350	≤350	≤350	≤350
Temporary Loss of Designated Farmland [a]				
Staging Areas	65	50	81	77

Note:
[a] Designated Farmland includes Prime Farmland, Farmland of Statewide Importance, and Unique Farmland
[b] Primarily converted to open space or grazing land.

With some of the Project features, particularly where farmland remains undeveloped, the land would retain some of its agricultural value and long-term agricultural viability; however, because the proposed Reach 2B component of the Restoration Program is a long-term effort, these lands would not likely return to active crop production and are considered to be converted to non-agricultural uses.

When comparing Alternative A to existing conditions, impacts to designated Farmland under the FMMP would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to No-Action). In summary, the Project would remove Prime Farmland, Farmland of Statewide Importance, and Unique Farmland from production over both the short and long term; this impact is considered **significant**.

Mitigation Measure LU-2 (Alternative A): ***Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*** Refer to Mitigation Measure LU-1 (Alternative A). The same mitigation measure would apply to this impact. Project proponents will recognize and minimize adverse effects on agricultural lands to the extent practicable, including modification of construction practices. However, this mitigation measure would not fully avoid the conversion of agricultural land to non-agricultural uses, and there are no additional measures to fully mitigate the loss of farmland; therefore, this impact would be **significant and unavoidable**.

Impact LU-3 (Alternative A): *Conflict with Williamson Act Contracts*. Compared to No-Action, implementation of Alternative A would result in potential conflicts with Williamson Act contracts in effect on agricultural properties in the Project area. In total, approximately 433 acres under Williamson Act contract are located in areas underlying the proposed levee system and other Project facilities, 81 acres in areas subject to temporary disturbance during construction, and 1,211 acres in areas within the proposed floodplain. In addition, about 350 acres of land would serve as borrow areas that are likely to be under a Williamson Act contract.

Generally, land uses and improvements on lands enrolled in Williamson Act contracts are limited to commercial agriculture or uses determined to be compatible or incidental to commercial agriculture. Project infrastructure (e.g., the proposed levee system and other facilities) and habitat restoration areas are not considered compatible or incidental to agriculture. However, under Alternative A, agricultural activity (likely livestock grazing) would be allowed on lands within the proposed floodplain outside passive riparian and floodplain habitat restoration areas; livestock grazing would likely be consistent with Williamson Act contracts in effect on these lands.

Although conflicts with the Williamson Act contracts are relative to existing contract provisions and portions of the Project area may be considered a "compatible use" under the Williamson Act, for the purpose of this analysis it is assumed that Williamson Act contracts would be canceled during land acquisition. Further, there would be no effect on existing agricultural landowners with respect to additional tax burdens as they would no longer own the land.

When comparing Alternative A to existing conditions, impacts to Williamson Act contracts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to No-Action). In summary, long-term restoration activities that are not consistent with or incidental to commercial agriculture would likely conflict with provisions in existing Williamson Act contracts in place in the Project area; this impact is considered **significant**.

Mitigation Measure LU-3 (Alternative A): ***Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*** Refer to Mitigation Measure LU-1 (Alternative A). The same mitigation measure would apply to this impact. Project proponents will recognize and minimize adverse effects on agricultural lands to the extent practicable, including modification of construction practices. However, this mitigation measure would not fully avoid the conversion of agricultural land to non-agricultural uses, and there are no additional measures to fully mitigate the loss of farmland; therefore, this impact would be **significant and unavoidable**.

Impact LU-4 (Alternative A): ***Degradation of Agricultural Land Productivity due to Seepage***. Under Alternative A, groundwater modeling indicates that approximately 380 acres of land outside the levee alignments could be subject to groundwater levels less than 7 feet below ground surface and a 320-acre subset of that area would be subject to groundwater levels less than 5 feet below ground surface; refer to Impact GRW-2 (Alternative A) in Section 13.3.3. To the extent that these seepage-affected areas are in agricultural production, there would be potential effects on the agricultural productivity of the land due to waterlogging of crops. However, a range of seepage control measures are incorporated into the Project that would avoid or minimize seepage outside the levee alignments. Seepage control measures implemented in the Project area could include slurry walls, interceptor drains, seepage wells, seepage berms, land acquisition (fee title or seepage easements) and other measures (see Section 2.2.4). Accordingly, potential effects on agricultural production would be avoided or minimized.

Compared to the No-Action Alternative, where adverse effects to agricultural production in the Project area would be minimized by the Program's activities to control flow through the reach, Alternative A would have similar effects to agricultural productivity on lands potentially affected by seepage in the Project area because seepage effects would be minimized by seepage control measures included as Project actions.

Compared to existing conditions, where seepage effects occurred only during flood flow years in Reach 2B (instead of the potential for more frequent seepage issues with Restoration Flows), Alternative A could potentially have an adverse effect on agricultural productivity in the Project area due to the additional capacity for Restoration Flows which would occur every year. However, with the seepage-related measures integrated into the Project (see Section 2.2.4), this impact would be **less than significant**.

Impact LU-5 (Alternative A): ***Conflict with Applicable Land Use Plans Regarding Agricultural Lands***. Current and future land use in the Project area is guided by the zoning ordinances and general plans maintained by Fresno and Madera counties. As shown in Table 16-6 above, nearly all of the land in the Project area is zoned and designated for agricultural use. In addition, corresponding land use policies are generally intended to protect and promote agriculture in the region. Compared to No-Action, Alternative A would result in the long-term conversion of agricultural land to non-agricultural uses, namely open space and conservation uses. As a result, Alternative A would conflict with existing agricultural zoning, general plan designations, and associated agricultural land use policies of Fresno and Madera counties. Because the Project alternatives would not convert land to urban uses, future agricultural production in the Project area would not be precluded, but would be unlikely once project facilities are in place. Properties that are transferred into public ownership and used for Project purposes could be re-classified under applicable zoning ordinances and general plans to reflect land uses proposed under the Project. This change in use would require general plan amendments in both Fresno and Madera counties, and the re-zoning process would be subsequent to these amendments.

Compared to existing conditions, Alternative A would conflict with applicable land use plans maintained by Fresno and Madera counties based on the conversion of agricultural land to other land uses; this impact is considered **potentially significant**.

Mitigation Measure LU-5 (Alternative A): ***Notify County Planning Agencies of General Plan and Zoning Ordinance Inconsistencies.*** Project proponents will recognize and minimize adverse effects on agricultural land use and zoning by notifying Fresno and Madera County planning agencies of any inconsistencies in designations and applicable polices for affected areas. By notifying affected planning agencies of conflicts with current land use plans, the significant impact can be reduced to **less than significant**.

> **Implementation Action:** Fresno and Madera County planning agencies will be notified of any inconsistencies in designations and applicable polices for affected areas.

> **Location:** Agricultural lands within the Project area.

Effectiveness Criteria: Effectiveness will be based on whether updates can be made by county planning agencies.

Responsible Agency: Reclamation and CSLC.

Monitoring/Reporting Action: Notifications of zoning and land use plan inconsistencies will be confirmed with Reclamation project managers and CSLC monitors.

Timing: Formal notification of any zoning and/or land use plan inconsistencies would occur after project approval.

Impact LU-6 (Alternative A): ***Diminishment of Agricultural Production by Increased Disease***. Compared to No-Action, additional riparian vegetation and floodplain area along the river could affect the incidence of some orchard and vineyard diseases on adjacent land by serving as a source of causal organisms. Some riparian plants are alternative hosts for the causal organisms of some diseases of fruit and nut crops; for example, *Botryosphaeria dothedia* has been isolated from riparian plants. This bacterium can cause a shoot blight on pistachio and a canker on almonds, and it occurs on a number of crop, ornamental, and wild plants, causing diseases in some of them (Ma et al. 2001). Also, English walnut (*Juglans regia*) and stone fruits (*Prunus* species, including cherries and plums) can invade and persist in riparian vegetation and host disease organisms that also could affect the same species in orchards.

However, for several reasons, riparian vegetation would not substantially reduce agricultural productivity by increasing the incidence of disease. First, disease-causing organisms occur on a variety of fruit and nut crops, and these crops occupy much larger acreages in the Project area than the additional acreage of riparian host plants that would result from Alternative A. Therefore, riparian vegetation would likely be a less important source of disease-causing organisms than orchard and vineyard vegetation. Second, the incidence of disease is not solely or even primarily determined by the presence of causal organisms in the vicinity of an orchard or vineyard. Physical conditions (including weather), irrigation and other management practices, and susceptibility of crop cultivars and their rootstocks, are also important factors in the incidence of disease. Third, incidence of disease is only one of many factors affecting agricultural productivity. For these reasons, implementing Alternative A would not substantially reduce agricultural productivity by increasing disease.

When comparing Alternative A to existing conditions, impacts would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). For the reasons described above, this impact would be **less than significant**.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Similar to all of the Project alternatives, Alternative B proposes habitat restoration activities in conjunction with an expanded floodplain and widened levee alignments, as well as new Project facilities that promote fish passage through Reach 2B. Alternative B

has a relatively wider floodplain configuration that is located across agricultural land. Similar to Alternatives A and D, agricultural uses would be allowed within the proposed floodplain under Alternative B. Alternative B also includes a mixture of active and passive riparian and floodplain habitat restoration. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Impact LU-1 (Alternative B): *Removal of Land from Agricultural Production*. Compared to No-Action, Alternative B would result in the removal of land from agricultural production in the Project area. As shown in Table 16-7 above, there are approximately 4,212 acres of land in agricultural production in the footprint of Alternative B. Of this total, about 1,032 acres would be subject to permanent loss of agricultural production, which includes the area underlying the proposed levee alignments and structures, the expanded floodplain, and borrow areas. In addition, another 42 acres of farmland would be temporarily disturbed during the 13-year construction period to accommodate features such as staging areas and access roads. Agricultural activity would be allowed on the floodplain within the proposed levee alignment (outside riparian habitat restoration areas) under Alternative B, up to 886 acres, however, because this area would be subject to frequent inundation, it is likely that agricultural activity would primarily be livestock grazing, a relatively low-value type of agriculture use compared to permanent and annual crop production that generate higher economic returns. Agricultural production on the remaining farmland within Alternative B, roughly 2,252 acres, would not be affected.

Table 16-10 shows agricultural impacts by crop type. The Project would affect both permanent and annual crops, with the greatest impacts expected on almonds, which account for nearly 35 percent of the agricultural land that would be taken out of production permanently. Other crops that would be taken out of production on a long-term basis include pistachios (15 percent of permanent agricultural losses), grapes (15 percent), row crops (10 percent), and vacant agricultural land (22 percent).

When comparing Alternative B to existing conditions (where there is no active habitat restoration in the Project area), impacts to agricultural land uses would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative B to No-Action). In summary, the Project would remove agricultural land from production over both the short term (i.e., during construction) and long term (i.e., into perpetuity) as lands are managed to meet the objectives and goals of the Settlement Agreement; this impact is considered **significant**.

Table 16-10.
Agricultural Effects by Crop Type, Alternative B

Crop Type	Type of Effect			
	Permanent Loss (acres)	Temporary Loss (acres)	Shift in Agricultural Activity (acres)	No Effect (acres)
Alfalfa	26	0	14	30
Almonds	402	1	259	1,302
Cotton	2	0	0	5
Grapes	107	20	186	310
Grazing	34	0	1	1
Other Row Crop	142	0	43	383
Palm	8	0	2	0
Pistachio	122	20	158	218
Agriculture-Vacant	190	0	224	3
Total	**1,032**	**42**	**886**	**2,252**

Mitigation Measure LU-1 (Alternative B): ***Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*** Refer to Mitigation Measure LU-1 (Alternative A). The same mitigation measure would apply to this impact. Project proponents will recognize and minimize adverse effects on agricultural lands to the extent practicable, including modification of construction practices. However, this mitigation measure would not fully avoid the conversion of agricultural land to non-agricultural uses, and there are no additional measures to fully mitigate the loss of farmland; therefore, this impact would be **significant and unavoidable**.

Impact LU-2 (Alternative B): ***Conversion of Designated Farmland to Non-Agricultural Uses***. Compared to No-Action, Alternative B would result in the conversion of designated Farmland in the Project area to non-agricultural uses (see Table 16-9), namely the permanent removal of 585 acres of Prime Farmland, 86 acres of Farmland of Statewide Importance, and 114 acres Unique Farmland from agricultural production to accommodate the proposed levees, floodplain restoration, and Project structures. Similar to all Project alternatives, an additional 350 acres of land would be required for borrow material to support construction activities; however, the exact location of the borrow areas is not known, although it is likely to occur on designated Farmland, which comprises about 88 percent of potential borrow areas under Alternative B. During construction, an additional 50 acres of designated Farmland would be temporarily taken out of production, but could return to active agriculture once the Project is complete. Lastly, approximately 786 acres of designated Farmland is located within the proposed floodplain, which would be available for agricultural activity (likely livestock grazing).

In cases where farmland remains undeveloped, the land would retain some of its agricultural value and long-term agricultural viability; however, because the proposed Reach 2B component of the Restoration Program is a long-term effort, these lands would

not likely return to active crop production and are considered to be converted to non-agricultural uses.

When comparing Alternative B to existing conditions, impacts to designated Farmland under the FMMP would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to No-Action). In summary, the Project would remove Prime Farmland, Farmland of Statewide Importance, and Unique Farmland from production over both the short- and long-term; this impact is considered **significant**.

Mitigation Measure LU-2 (Alternative B): ***Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*** Refer to Mitigation Measure LU-1 (Alternative A). The same mitigation measure would apply to this impact. Project proponents will recognize and minimize adverse effects on agricultural lands to the extent practicable, including modification of construction practices. However, this mitigation measure would not fully avoid the conversion of agricultural land to non-agricultural uses, and there are no additional measures to fully mitigate the loss of farmland; therefore, this impact would be **significant and unavoidable**.

Impact LU-3 (Alternative B): ***Conflict with Williamson Act Contracts***. Compared to No-Action, Alternative B would result in potential conflicts with Williamson Act contracts in effect on agricultural properties in the Project area. In total, approximately 172 acres under Williamson Act contract are located in areas underlying the proposed levee system and other Project facilities, 56 acres in areas subject to temporary disturbance during construction, and 1,543 acres in areas within the proposed floodplain. In addition, about 350 acres of land would serve as borrow areas that are likely to be under a Williamson Act contract.

Generally, land uses and improvements on lands enrolled in Williamson Act contracts are limited to commercial agriculture or uses determined to be compatible or incidental to commercial agriculture. Alternative B infrastructure and habitat restoration areas are not considered compatible or incidental to agriculture. However, under Alternative B, agricultural activity (likely livestock grazing) would be allowed on lands within the proposed floodplain outside riparian and floodplain habitat restoration areas; livestock grazing would likely be consistent with Williamson Act contracts in effect on these lands.

Although conflicts with Williamson Act contracts are relative to existing contract provisions and portions of the Project area may be considered a “compatible use” under the Williamson Act, for the purpose of this analysis it is assumed that Williamson Act contracts would be canceled during land acquisition. Further, there would be no effect on existing agricultural landowners with respect to additional tax burdens as they would no longer own the land.

When comparing Alternative B to existing conditions, impacts to Williamson Act contracts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to No-Action). In summary, long-term restoration activities that are not consistent or incidental to commercial agriculture would likely conflict with

Williamson Act contracts in place in the Project area; this impact is considered **significant**.

Mitigation Measure LU-3 (Alternative B): ***Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*** Refer to Mitigation Measure LU-1 (Alternative A). The same mitigation measure would apply to this impact. Project proponents will recognize and minimize adverse effects on agricultural lands to the extent practicable, including modification of construction practices. However, this mitigation measure would not fully avoid the conversion of agricultural land to non-agricultural uses, and there are no additional measures to fully mitigate the loss of farmland; therefore, this impact would be **significant and unavoidable**.

Impact LU-4 (Alternative B): *Degradation of Agricultural Land Productivity due to Seepage*. Under Alternative B, groundwater modeling indicates that outside the levee alignments, approximately 440 acres could be subject to groundwater levels less than 7 feet below ground surface and a 360-acre subset of that area would be subject to groundwater levels less than 5 feet below ground surface; refer to Impact GRW-2 (Alternative B) in Section 13.3.3. To the extent that the areas subject to seepage effects are in agricultural production, there would be potential effects on the agricultural productivity of the land due to waterlogging of crops. However, a range of seepage control measures incorporated into the Project would avoid or minimize seepage outside the levee alignments. Seepage control measures implemented in the Project area could include slurry walls, interceptor drains, seepage wells, seepage berms, land acquisition (fee title or seepage easements) and other measures (see Section 2.2.4). Accordingly, potential effects on agricultural production would be avoided or minimized.

Under No-Action conditions adverse effects to agricultural production in the Project area would be would be minimized by the Program's seepage control measures, such as activities to control flow through the reach. Compared to the No-Action Alternative, Alternative B would result in similar effects to agricultural productivity on lands potentially affected by seepage in the Project area because seepage effects would be minimized by seepage control measures included as Project actions.

Compared to existing conditions, where seepage effects occurred only during flood flow years in Reach 2B (instead of the potential for more frequent seepage issues with Restoration Flows), Alternative B could potentially have an adverse effect on agricultural productivity in the Project area due to the additional capacity for Restoration Flows which would occur every year. However, with the seepage-related measures integrated into the Project (see Section 2.2.4), this impact would be **less than significant**.

Impact LU-5 (Alternative B): *Conflict with Applicable Land Use Plans Regarding Agricultural Lands*. Under Alternative B, potential conflicts with applicable land use plans would generally be the same as those described for Alternative A; refer to Impact LU-5 (Alternative A) for details. Compared to existing conditions, Alternative B would conflict with applicable land use plans, including the Fresno and Madera County zoning ordinances and general plans based on the conversion of agricultural land to other land uses; this impact is considered **potentially significant**.

Mitigation Measure LU-5 (Alternative B): ***Notify County Planning Agencies of General Plan and Zoning Ordinance Inconsistencies.*** Refer to Mitigation Measure LU-5 (Alternative A). The same mitigation measure would apply to this impact. Project proponents will recognize and minimize adverse effects on agricultural land use and zoning by notifying Fresno and Madera County planning agencies of any inconsistencies in designations and applicable polices for affected areas. By notifying affected planning agencies of conflicts with current land use plans, the significant impact can be reduced to **less than significant**.

Impact LU-6 (Alternative B): ***Diminishment of Agricultural Production by Increased Disease***. Compared to No-Action, additional riparian vegetation and floodplain area along the river could affect the incidence of some orchard and vineyard diseases on adjacent land by serving as a source of causal organisms. However, the additional sources of causal organisms that could result from implementing Alternative B would not substantially reduce agricultural activity for several reasons: disease-causing organisms could already occur on a variety of widely planted fruit and nut crops in the Project area, the incidence of disease is not solely or even primarily determined by the presence of causal organisms in the vicinity of an orchard or vineyard, and incidence of disease is only one of many factors affecting agricultural productivity.

When comparing Alternative B to existing conditions, impacts would be similar to those discussed in the preceding paragraph (i.e., the comparison of Alternative B to No-Action). This impact would be **less than significant**.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Similar to all of the Project alternatives, Alternative C proposes habitat restoration activities in conjunction with an expanded floodplain and widened levee alignments, as well as new Project facilities that promote fish passage through Reach 2B. Alternative C has a relatively narrow floodplain configuration. Unlike Alternatives A and D, agricultural uses would not be allowed within the proposed floodplain under Alternative C. Alternative C includes active riparian and floodplain habitat restoration. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Impact LU-1 (Alternative C): ***Removal of Land from Agricultural Production***. Compared to No-Action, Alternative C would result in the removal of land from agricultural production in the Project area. As shown in Table 16-7 above, there are approximately 4,090 acres of land in agricultural production in the footprint of Alternative C. Of this total, about 1,567 acres would be subject to permanent loss of agricultural production, which includes the area underlying the proposed levee alignments and structures, the expanded floodplain, and borrow areas. In addition, another 73 acres of farmland would be temporarily disturbed during the 11-year construction period to accommodate features such as staging areas and access roads. Agricultural production on the remaining farmland within Alternative C, roughly 2,450 acres, would not be affected.

Table 16-11 shows agricultural effects by crop type. The Project would affect both permanent and annual crops, with the greatest impacts expected on almonds, which

account for nearly 35 percent of the agricultural land that would be taken out of production permanently. Other crops that would be taken out of production on a long-term basis include vacant agricultural land (27 percent of permanent agricultural losses), and pistachios (17 percent).

Table 16-11.
Agricultural Effects by Crop Type, Alternative C

Crop Type	Type of Effect			
	Permanent Loss (acres)	Temporary Loss (acres)	Shift in Agricultural Activity (acres)	No Effect (acres)
Alfalfa	28	3	0	37
Almonds	551	1	0	1,334
Cotton	2	7	0	5
Grapes	138	20	0	461
Grazing	38	0	0	1
Other Row Crop	129	20	0	367
Palm	10	0	0	0
Pistachio	266	20	0	232
Agriculture-Vacant	403	1	0	13
Total	**1,567**	**73**	**0**	**2,450**

When comparing Alternative C to existing conditions (where there is no active habitat restoration in the Project area), impacts to agricultural land uses would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative C to No-Action). In summary, the Project would remove agricultural land from production over both the short term (i.e., during construction) and long term (i.e., into perpetuity) as lands are managed to meet the objectives and goals of the Settlement Agreement; this impact is considered **significant**.

Mitigation Measure LU-1 (Alternative C): ***Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*** Refer to Mitigation Measure LU-1 (Alternative A). The same mitigation measure would apply to this impact. Project proponents will recognize and minimize adverse effects on agricultural lands to the extent practicable, including modification of construction practices. However, this mitigation measure would not fully avoid the conversion of agricultural land to non-agricultural uses, and there are no additional measures to fully mitigate the loss of farmland; therefore, this impact would be **significant and unavoidable**.

Impact LU-2 (Alternative C): ***Conversion of Designated Farmland to Non-Agricultural Uses***. Compared to No-Action, Alternative C would result in the conversion of designated Farmland in the Project area to non-agricultural uses (see Table 16-9), namely the permanent removal of 939 acres of Prime Farmland, 163 acres of Farmland of Statewide Importance, and 116 acres Unique Farmland from agricultural production to accommodate the proposed levees, floodplain restoration, and Project structures. Similar

to all Project alternatives, an additional 350 acres of land would be required for borrow material to support construction activities; however, the exact location of the borrow areas is not known, although it is likely to occur on Farmland, which comprises about 88 percent of potential borrow areas under Alternative C. Finally, during construction, an additional 81 acres of Farmland would be temporarily taken out of production, but could return to active agriculture once the Project is complete. In cases where farmland remains undeveloped (e.g., floodplain), the land would retain some of its agricultural value and long-term agricultural viability; however, because the proposed Reach 2B component of the Restoration Program is a long-term effort, these lands would not likely return to active crop production and are considered to be converted to non-agricultural uses.

When comparing Alternative C to existing conditions, impacts to designated farmland under the FMMP would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative C to No-Action). In summary, the Project would remove Prime Farmland, Farmland of Statewide Importance, and Unique Farmland from production over both the short and long term; this impact is considered **significant**.

Mitigation Measure LU-2 (Alternative C): ***Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*** Refer to Mitigation Measure LU-1 (Alternative A). The same mitigation measure would apply to this impact. Project proponents will recognize and minimize adverse effects on agricultural lands to the extent practicable, including modification of construction practices. However, this mitigation measure would not fully avoid the conversion of agricultural land to non-agricultural uses, and there are no additional measures to fully mitigate the loss of farmland; therefore, this impact would be **significant and unavoidable**.

Impact LU-3 (Alternative C): ***Conflict with Williamson Act Contracts***. Compared to No-Action, Alternative C would result in potential conflicts with Williamson Act contracts in effect on agricultural properties in the Project area. In total, approximately 173 acres under Williamson Act contract are located in areas underlying the proposed levee system and other Project facilities, 118 acres in areas subject to temporary disturbance during construction, and 1,211 acres in areas within the proposed floodplain. In addition, about 350 acres of land would serve as borrow areas that are likely to be under a Williamson Act contract.

Generally, land uses and improvements on lands enrolled in Williamson Act contracts are limited to commercial agriculture or uses determined to be compatible or incidental to commercial agriculture. However, Project infrastructure and habitat restoration areas are not considered compatible or incidental to agriculture.

Although conflicts with Williamson Act contracts are relative to existing contract provisions and portions of the Project area may be considered a “compatible use” under the Williamson Act, for the purpose of this analysis it is assumed that Williamson Act contracts would be canceled during land acquisition. Further, there would be no effect on existing agricultural landowners with respect to additional tax burdens.

When comparing Alternative C to existing conditions, impacts to Williamson Act contracts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative C to No-Action). In summary, long-term restoration activities that are not consistent or incidental to commercial agriculture would likely conflict with Williamson Act contracts in place in the Project area; this impact is considered **significant**.

Mitigation Measure LU-3 (Alternative C): ***Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*** Refer to Mitigation Measure LU-1 (Alternative A). The same mitigation measure would apply to this impact. Project proponents will recognize and minimize adverse effects on agricultural lands to the extent practicable, including modification of construction practices. However, this mitigation measure would not fully avoid the conversion of agricultural land to non-agricultural uses, and there are no additional measures to fully mitigate the loss of farmland; therefore, this impact would be **significant and unavoidable**.

Impact LU-4 (Alternative C): ***Degradation of Agricultural Land Productivity due to Seepage***. Under Alternative C, potential degradation of agricultural land productivity due to seepage would be the similar to that described under Alternative A as both alternatives propose a narrow floodplain; refer to Impact LU-4 (Alternative A) for details. Approximately 400 acres could be subject to groundwater levels less than 7 feet below ground surface and a 330-acre subset of that area would be subject to groundwater levels less than 5 feet below ground surface. Compared to the No-Action Alternative, where adverse effects to agricultural production in the Project area would be minimized by the Program's activities to control flow through the reach, Alternative C would have similar effects to agricultural productivity on lands potentially affected by seepage in the Project area because seepage effects would be minimized by seepage control measures included as Project actions.

Compared to existing conditions, where seepage effects occurred only during flood flow years in Reach 2B (instead of the potential for more frequent seepage issues with Restoration Flows), Alternative C could potentially have an adverse effect on agricultural productivity in the Project area due to the additional capacity for Restoration Flows which would occur every year. However, with the seepage-related measures integrated into the Project (see Section 2.2.4), this impact would be **less than significant**.

Impact LU-5 (Alternative C): ***Conflict with Applicable Land Use Plans Regarding Agricultural Lands***. Under Alternative C, potential conflicts with applicable land use plans would generally be the same as those described for Alternative A; refer to Impact LU-5 (Alternative A) for details. Compared to existing conditions, Alternative C would conflict with applicable land use plans, including the Fresno and Madera County zoning ordinances and general plans based on the conversion of agricultural land to other land uses; this impact is considered **potentially significant**.

Mitigation Measure LU-5 (Alternative C): ***Notify County Planning Agencies of General Plan and Zoning Ordinance Inconsistencies.*** Refer to Mitigation Measure LU-5 (Alternative A). The same mitigation measure would apply to this impact. Project

proponents will recognize and minimize adverse effects on agricultural land use and zoning by notifying Fresno and Madera County planning agencies of any inconsistencies in designations and applicable polices for affected areas. By notifying affected planning agencies of conflicts with current land use plans, the significant impact can be reduced to **less than significant**.

Impact LU-6 (Alternative C): ***Diminishment of Agricultural Production by Increased Disease***. Compared to No-Action, additional riparian vegetation and floodplain area along the river could affect the incidence of some orchard and vineyard diseases on adjacent land by serving as a source of causal organisms. However, the additional sources of causal organisms that could result from implementing Alternative C would not substantially reduce agricultural activity for several reasons: disease-causing organisms could already occur on a variety of widely planted fruit and nut crops in the Project area, the incidence of disease is not solely or even primarily determined by the presence of causal organisms in the vicinity of an orchard or vineyard, and incidence of disease is only one of many factors affecting agricultural productivity.

When comparing Alternative C to existing conditions, impacts would be similar to those discussed in the preceding paragraph (i.e., the comparison of Alternative C to No-Action). This impact would be **less than significant**.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Similar to all of the Project alternatives, Alternative D proposes habitat restoration activities in conjunction with an expanded floodplain and widened levee alignments, as well as new Project facilities that promote fish passage through Reach 2B. Alternative D has a relatively wider floodplain configuration that is located across agricultural land. Alternative D includes passive riparian habitat restoration and farming in the floodplain. Similar to Alternatives A and B, agricultural uses that are suitable within the proposed floodplain would be allowed under Alternative D. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Impact LU-1 (Alternative D): ***Removal of Land from Agricultural Production***. Compared to No-Action, Alternative D would result in the removal of land from agricultural production in the Project area. As shown in Table 16-7 above, there is approximately 4,208 acres of land in agricultural production in the footprint of Alternative D. Of this total, about 1,347 acres would be subject to permanent loss of agricultural production, which includes the area underlying the proposed levee alignments and structures, borrow areas, and passive riparian habitat restoration areas within the floodplain. In addition, another 69 acres of farmland would be temporarily disturbed during the 13-year construction period to accommodate features such as staging areas and access roads. Agricultural activity would be allowed on the floodplain within the proposed levee alignment (outside riparian habitat restoration areas) under Alternative D, up to 956 acres; however, because this area would be subject to frequent inundation, it is likely that agricultural activity would primarily be livestock grazing. Agricultural production on the remaining farmland within Alternative D, roughly 1,835 acres, would not be affected.

Table 16-12 shows agricultural effects by crop type. The Project would affect both permanent and annual crops, with the greatest impacts expected on almonds, which account for about 35 percent of the agricultural land that would be taken out of production permanently. Other crops that would be taken out of production on a long-term basis include row crops (18 percent of permanent agricultural losses), vacant agricultural land (15 percent), grapes (15 percent), and pistachios (11 percent).

Table 16-12.
Agricultural Effects by Crop Type, Alternative D

Crop Type	Type of Effect			
	Permanent Loss (acres)	Temporary Loss (acres)	Shift in Agricultural Activity (acres)	No Effect (acres)
Alfalfa	27	3	22	17
Almonds	493	1	308	1,167
Cotton	2	7	0	5
Grapes	205	20	71	323
Grazing	38	0	0	1
Other Row Crop	239	16	5	285
Palm	8	0	2	0
Pistachio	138	20	324	37
Agriculture-Vacant	197	1	225	0
Total	**1,347**	**69**	**956**	**1,835**

When comparing Alternative D to existing conditions (where there is no active habitat restoration in the Project area), impacts to agricultural land uses would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative D to No-Action). In summary, the Project would remove agricultural land from production over both the short term (i.e., during construction) and long term (i.e., into perpetuity) as lands are managed to meet the objective and goals of the Settlement Agreement; this impact is considered **significant**.

Mitigation Measure LU-1 (Alternative D): ***Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*** Refer to Mitigation Measure LU-1 (Alternative A). The same mitigation measure would apply to this impact. Project proponents will recognize and minimize adverse effects on agricultural lands to the extent practicable, including modification of construction practices. However, this mitigation measure would not fully avoid the conversion of agricultural land to non-agricultural uses, and there are no additional measures to fully mitigate the loss of farmland; therefore, this impact would be **significant and unavoidable**.

Impact LU-2 (Alternative D): ***Conversion of Designated Farmland to Non-Agricultural Uses***. Compared to No-Action, Alternative D would result in the conversion of designated Farmland in the Project area to non-agricultural uses (see Table 16-9).

Specifically, Alternative D would permanently remove 917 acres of Prime Farmland, 112 acres of Farmland of Statewide Importance, and 113 acres Unique Farmland from agricultural production to accommodate the proposed levees, floodplain restoration, and other Project structures. An additional 350 acres of land would be required for borrow material to support construction activities; however, the exact location of the borrow areas is not known, although it is likely to occur on Farmland, which comprises about 86 percent of potential borrow areas under Alternative D. During construction, another 77 acres of Farmland would be temporarily taken out of production, but could return to active agriculture once the Project is complete. Lastly, approximately 862 acres of Farmland is located within the proposed floodplain, which would be available for agricultural activity (likely livestock grazing) under Alternative D. With some of the Project features, particularly where farmland remains undeveloped, the land would retain some of its agricultural value and long-term agricultural viability; however, because the proposed Reach 2B component of the Restoration Program is a long-term effort, these lands would not likely return to active crop production and are considered to be converted to non-agricultural uses.

When comparing Alternative D to existing conditions, impacts to designated farmland under the FMMP would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative D to No-Action). In summary, the Project would remove Prime Farmland, Farmland of Statewide Importance, and Unique Farmland from production over both the short and long term; this impact is considered **significant**.

Mitigation Measure LU-2 (Alternative D): ***Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*** Refer to Mitigation Measure LU-1 (Alternative A). The same mitigation measure would apply to this impact. Project proponents will recognize and minimize adverse effects on agricultural lands to the extent practicable, including modification of construction practices. However, this mitigation measure would not fully avoid the conversion of agricultural land to non-agricultural uses, and there are no additional measures to fully mitigate the loss of farmland; therefore, this impact would be **significant and unavoidable**.

Impact LU-3 (Alternative D): ***Conflict with Williamson Act Contracts***. Compared to No-Action, implementation of Alternative D would result in potential conflicts with Williamson Act contracts in place on agricultural properties in the Project area. In total, approximately 551 acres under Williamson Act contract are located in areas underlying the proposed levee system and other Project facilities, 104 acres in areas subject to temporary disturbance during construction, and 1,635 acres within the proposed floodplain. In addition, about 350 acres of land would serve as borrow areas that are likely to be under a Williamson Act contract.

Generally, land uses and improvements on lands enrolled in Williamson Act contracts are limited to commercial agriculture or uses determined to be compatible or incidental to commercial agriculture. Project infrastructure (e.g., the proposed levee system and other facilities) and habitat restoration areas are not considered compatible or incidental to agriculture. However, under Alternative D, agricultural activity (likely livestock grazing) would be allowed on lands within the proposed floodplain (outside riparian and

floodplain habitat restoration areas); livestock grazing would likely be consistent with Williamson Act contracts in effect on these lands.

Although conflicts with the Williamson Act are relative to existing contract provisions and portions of the Project area may be considered a "compatible use" under the Williamson Act, for the purpose of this analysis it is assumed that Williamson Act contracts would be canceled during land acquisition. Further, there would be no effect on existing agricultural landowners with respect to additional tax burdens.

When comparing Alternative D to existing conditions, impacts to Williamson Act contracts would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative D to No-Action). In summary, long-term restoration activities that are not consistent or incidental to commercial agriculture would likely conflict with Williamson Act contracts in place in the Project area; this impact is considered **significant**.

Mitigation Measure LU-3 (Alternative D): ***Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*** Refer to Mitigation Measure LU-1 (Alternative A). The same mitigation measure would apply to this impact. Project proponents will recognize and minimize adverse effects on agricultural lands to the extent practicable, including modification of construction practices. However, this mitigation measure would not fully avoid the conversion of agricultural land to non-agricultural uses, and there are no additional measures to fully mitigate the loss of farmland; therefore, this impact would be **significant and unavoidable**.

Impact LU-4 (Alternative D): ***Degradation of Agricultural Land Productivity due to Seepage***. Under Alternative D, potential degradation of agricultural land productivity due to seepage would be similar to that described under Alternative B as both alternatives include a wider floodplain; refer to Impact LU-4 (Alternative B) for details. Approximately 400 acres could be subject to groundwater levels less than 7 feet below ground surface and a 330-acre subset of that area would be subject to groundwater levels less than 5 feet below ground surface. Compared to the No-Action Alternative, where adverse effects to agricultural production in the Project area would be minimized by the Program's activities to control flow through the reach, Alternative D would have similar effects to agricultural productivity on lands potentially affected by seepage in the Project area because seepage effects would be minimized by seepage control measures included as Project actions.

Compared to existing conditions, where seepage effects occurred only during flood flow years in Reach 2B (instead of the potential for more frequent seepage issues with Restoration Flows), Alternative D could potentially have an adverse effect on agricultural productivity in the Project area due to the additional capacity for Restoration Flows which would occur every year. However, with the seepage-related measures integrated into the Project (see Section 2.2.4), this impact would be **less than significant**.

Impact LU-5 (Alternative D): ***Conflict with Applicable Land Use Plans Regarding Agricultural Lands***. Under Alternative D, potential conflicts with applicable land use

plans would generally be the same as those described for Alternative A; refer to Impact LU-5 (Alternative A) for details. Compared to existing conditions, Alternative D would conflict with applicable land use plans, including the Fresno and Madera County zoning ordinances and general plans based on the conversion of agricultural land to other land uses; this impact is considered **potentially significant**.

Mitigation Measure LU-5 (Alternative D): ***Notify County Planning Agencies of General Plan and Zoning Ordinance Inconsistencies.*** Refer to Mitigation Measure LU-5 (Alternative A). The same mitigation measure would apply to this impact. Project proponents will recognize and minimize adverse effects on agricultural land use and zoning by notifying Fresno and Madera County planning agencies of any inconsistencies in designations and applicable polices for affected areas. By notifying affected planning agencies of conflicts with current land use plans, the significant impact can be reduced to **less than significant**.

Impact LU-6 (Alternative D): ***Diminishment of Agricultural Production by Increased Disease***. Compared to No-Action, additional riparian vegetation and floodplain area along the river could affect the incidence of some orchard and vineyard diseases on adjacent land by serving as a source of causal organisms. However, the additional sources of causal organisms that could result from implementing Alternative D would not substantially reduce agricultural activity for several reasons: disease-causing organisms could already occur on a variety of widely planted fruit and nut crops in the Project area, the incidence of disease is not solely or even primarily determined by the presence of causal organisms in the vicinity of an orchard or vineyard, and incidence of disease is only one of many factors affecting agricultural productivity.

When comparing Alternative D to existing conditions, impacts would be similar to those discussed in the preceding paragraph (i.e., the comparison of Alternative D to No-Action). This impact would be **less than significant**.

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17.0 Noise and Vibration

The following sections provide information regarding the affected noise environment and include discussions regarding acoustics and noise measurements and relevant laws, ordinances, regulations, and standards related to environmental noise exposure in the vicinity of the Project. This chapter also describes environmental consequences and mitigation measures, as they pertain to implementation of the Project alternatives in the Project area.

17.1 Environmental Setting

As shown in Figure 17-1, the Project is located along the San Joaquin River, extending from below Mendota Dam to the Chowchilla Bifurcation Structure, and borders unincorporated portions of the Madera and Fresno counties.

17.1.1 Fundamentals of Acoustics

Noise is defined as unwanted sound. Sound levels are measured on a logarithmic scale in decibels (dB). The most common descriptor of sound and noise associated with community noise exposure is the A-weighted sound pressure level (dBA). It is defined as the sound pressure level in decibels as measured on a sound meter using the A-weighting filter network. The A-weighted frequency filter de-emphasizes the very low and very high frequency components of sound in a manner that simulates the frequency response of human hearing, and correlates well with people's group reactions to sound and environmental noise. All sound levels in this report are A-weighted. A-weighted sound pressure levels of typical sources of noise are shown in Table 17-1.

The ambient sound level is the existing sound level resulting from natural and mechanical sources and human activity considered normally present in a particular area. The ambient noise level is composed of the cumulative sum of all noise sources, both near and far. The background noise level generally describes the mixture of indistinguishable sounds from many sources without any one dominating sound. It is the noise level that exists in the absence of identifiable, sporadic, individual noise events such as those caused by individual automobile pass-bys, aircraft overflights, intermittent dog barking, etc.

Humans are better able to perceive relative change in noise levels than absolute noise levels. Potential responses of persons to changes in the noise environment are usually assessed by evaluating differences between the existing and total predicted future noise environments.

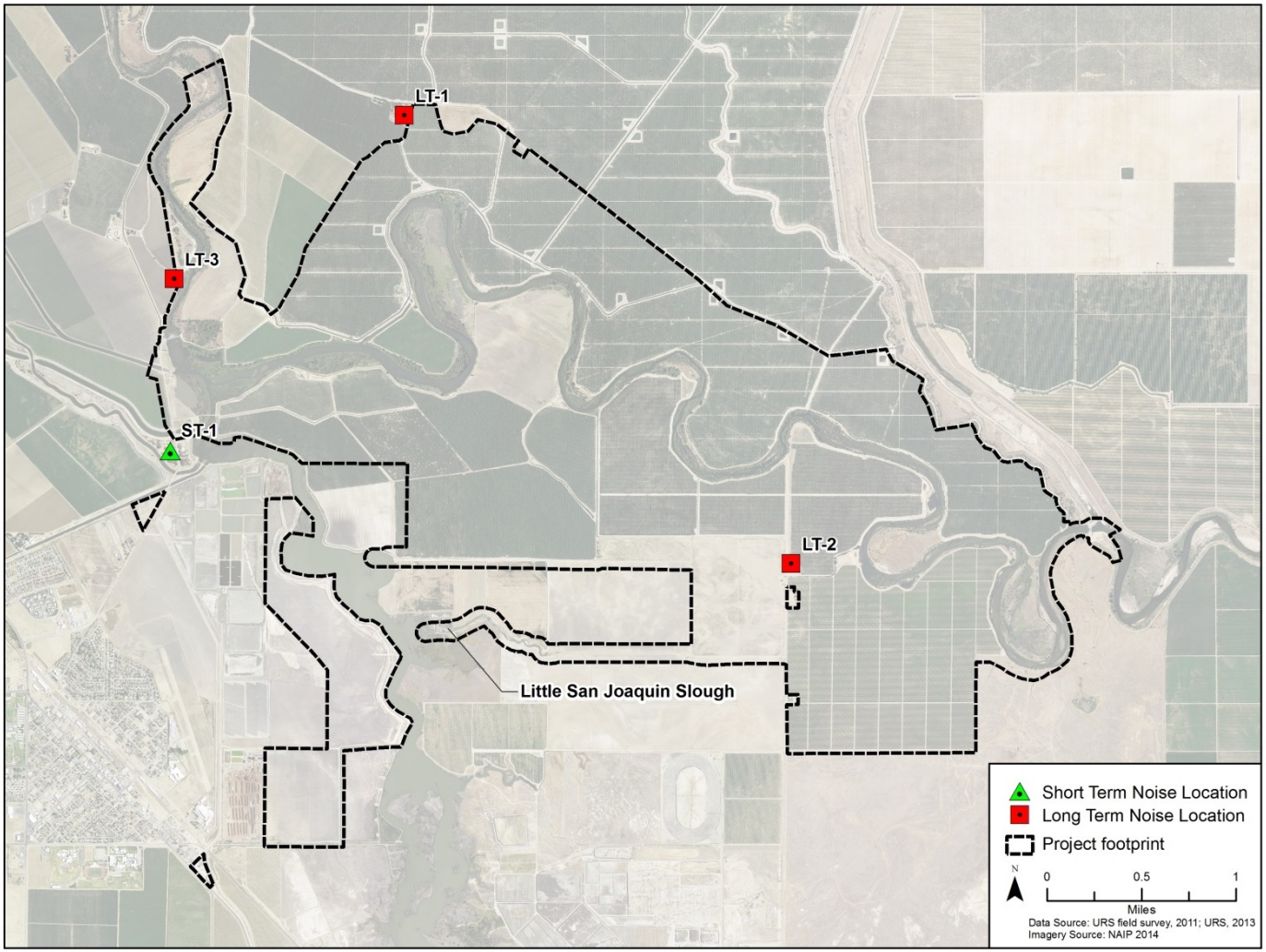


Figure 17-1.
Project Area and Ambient Noise Measurement Locations

Table 17-1.
Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at a given distance)	Scale of dBA Sound Levels	Noise Environment	Human Judgment of Noise Loudness (Relative to a Reference Loudness of 70 dBs*)
Commercial Jet Take-off (200 ft.)	120		Threshold of pain *32 times as loud
Pile Driver (50 ft.)	110	Rock Music Concert	*16 times as loud
Ambulance Siren (100 ft.) Newspaper Press (5 ft.) Power Lawn Mower (3 ft.)	100		Very loud *8 times as loud
Motorcycle (25 ft.) Propeller Plane Flyover (1000 ft.) Diesel Truck, 40 mph (50 ft.)	90	Boiler Room Printing Press Plant	*4 times as loud
Garbage Disposal (3 ft.)	80	High Urban Ambient Sound	*2 times as loud
Passenger Car, 65 mph (25 ft.) Vacuum Cleaner (10 ft.)	70		Moderately loud *70 decibels (Reference loudness)
Normal Conversation (5 ft.) Air Conditioning Unit (100 ft.)	60	Data Processing Center Department Store	*1/2 as loud
Light Traffic (100 ft.)	50	Private Business Office	*1/4 as loud
Bird Calls (distant)	40	Lower Limit of Urban Ambient Sound	Quiet *1/8 as loud
Soft. Whisper (5 ft.)	30	Quiet Bedroom	
	20	Recording Studio	Very quiet
	0		Threshold of hearing

Source: Harris 1991, Reherman et al. 2006, FTA 2006
Key:
dB = decibels
dBA = A-weighted decibels
ft. = feet
mph = miles per hour

The following relationships of perception and response to quantifiable noise changes are used as a basis for assessing potential effects of these changes in environmental noise level:

- Except in a carefully controlled laboratory condition, a change of 1 dBA is very difficult to perceive.
- In the outside environment, a 3 dBA change is considered just perceptible.
- An increase of 5 dBA is considered readily perceptible and could result in a change in community response.
- A 10 dBA increase is perceived as a doubling in loudness and would likely result in a widespread community response.

Because of the logarithmic nature of the dB unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. However, some simple rules are useful in dealing with sound levels. First, if a sound's intensity is

doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example, 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB. Human perception is different. In terms of human response, a 3 dB change is just perceptible and a 10 dB change is perceived as a doubling or halving of sound level.

Because environmental noise varies with time, it is necessary to define certain measurement terms that are used to characterize this fluctuating quantity. The energy-average level over a specific period is defined as the Equivalent Sound Level (L_{eq}). The L_{eq} is the sound pressure level over a time interval that is equivalent to a perfectly constant sound pressure level containing the same acoustic energy over the same interval. Thus, L_{eq} includes all sporadic or transient events occurring during the time period.

In addition to the L_{eq} metric, the statistical distribution of measured sound levels is used to describe the range of noise levels measured during a given period. This metric is presented as $L_{N,}$ which is the sound level exceeded N percent of the time during a given measurement interval. For example, L_{10} (in dBA) is the sound level exceeded 10 percent of the time and this level is commonly used to represent loud transient events occurring during the measurement period. L_{50} is the sound level that is exceeded 50 percent of the time and represents the median sound level. L_{90} is the sound level exceeded 90 percent of the time and this level represents the background noise levels of the measurement. The maximum A-weighted noise level recorded for a single event is defined as L_{max}.

Other descriptors of noise are also commonly used to identify noise/land use compatibility guidelines and assist in the prediction of community reaction to adverse effects of environmental noise, including traffic-generated and industrial noise. These descriptors include the Day-Night Noise Level (L_{dn}); and in California, the Community Noise Equivalent Level (CNEL) descriptor is used. Each of these descriptors uses units of dBA. Both L_{dn} and CNEL noise metrics represent 24-hour periods and both apply a time-weighted factor designed to penalize noise events that occur during evening or nighttime hours, when relaxation and sleep disturbance is of more concern. The time-weighting adds a 5 dBA penalty to the hourly L_{eq} noise levels from 7:00 p.m. to 10:00 p.m. (evening period) and a 10 dBA penalty from 10:00 p.m. to 7:00 a.m. (nighttime period). For CNEL, daytime is defined as the time between 7:00 a.m. to 7:00 p.m., and for L_{dn} daytime is defined as the time between 7:00 a.m. to 10:00 p.m. The use of either the CNEL or L_{dn} noise metric is mandated by State guidelines for noise/land use compatibility planning purposes and are the predominant metrics used by local governments to describe noise environments within their jurisdictions.

Pressure waves of sound can be generated by vibrating structures and can induce vibration in structures. Vibration is caused by any force acting on a surface of a structure that causes it to move back and forth from its normal resting position. In contrast to airborne noise, ground-borne vibration is often not perceptible. For example, it is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Most perceptible indoor vibration is caused by sources within buildings such as operation of mechanical equipment, movement of people or slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. Construction activities which

can cause perceptible vibrations include pile-driving and operating heavy earth-moving equipment.

In contrast to airborne noise, ground-borne vibration is not a phenomenon that most people experience every day. The background vibration velocity level in residential areas is usually 50 vibration decibels (VdB) or lower, well below the human threshold of perception which is around 65 VdB. Although the perceptibility threshold is about 65 VdB, human response to vibration is not usually significant unless the vibration exceeds 70 VdB (Federal Transit Administration [FTA] 2006).

17.1.2 Ambient Noise Measurements

The Project would be located along Reach 2B of the San Joaquin River, primarily in between Mendota Dam and the Chowchilla Bifurcation Structure, but also along a portion of Reach 3 below Mendota Dam. Nearby jurisdictions include the city of Mendota and unincorporated areas of Fresno and Madera counties.

Ambient noise measurements were conducted at four representative locations, of which three were 24-hour measurements and one was a short-term measurement. These locations are shown in Figure 17-1. The noise measurements were taken during the last week of December, between two major holidays, well after the growing season. Accordingly, these measurements provide a conservative estimate of ambient noise. The ambient noise levels varied throughout the Project area that would be used for project equipment staging, haul routes, and construction. Noise levels vary based on population density, distance to nearby traffic, aircraft flight patterns, nearby wildlife (for example, passing birds and insects), weather and other various conditions. During the noise measurements, the temperature was on average 48 degrees Fahrenheit with an average humidity of 50 percent. Winds ranged from calm to moderate with the highest recorded wind speed of 6 miles per hour. The weather was consistently clear throughout the entire noise measurement period.

All sound level meters were set to measure dBA noise levels at the slow meter response setting.[1] The sound level meters were placed in key locations that represented the ambient noise levels at representative locations. Each meter was calibrated before and after each measurement period. Certificates of calibration for the sound level meters and the calibrator used during the ambient noise level measurement survey can be found in Appendix 17-A. Locations where measurements were conducted are considered representative receivers of existing ambient noise levels within the Project area. Existing noise levels for the noise measurement sites are presented below. The field measurement data sheets can be found in Appendix 17-B.

LT-1

The noise-sensitive receiver located at LT-1 represents a cluster of single-family residences surrounded by agricultural land. The noise-sensitive receiver is located north of the San Joaquin River in an unincorporated area of Madera County. The sound level meter was mounted to a power pole near the intersection of Eastside Drive and Drive 10

[1] The slow meter response setting is a setting where the meter detects sound level changes over at least one second in duration. It is used for evaluating continuous and average noise levels.

½ Road. Table 17-2 lists the results of the long-term measurement conducted at measurement site LT-1. The primary noise sources in the area consisted of traffic and nearby farming activity. The average daytime ambient noise level (L_{eq}) was 49.9 dBA and hourly L_{eq} values ranged from 36.2 to 57.2 dBA. The average evening ambient noise level (L_{eq}) was 49.6 dBA and hourly L_{eq} values ranged from 44.1 to 52 dBA. The average nighttime ambient noise level (L_{eq}) was 45.3 dBA and hourly L_{eq} values ranged from 36.6 to 49.1 dBA. The difference between the daytime and nighttime L_{eq} is 4.6 dBA, which is to be expected for an isolated environment with very little human activity. The ambient noise level would be equivalent to refrigerator humming or a quiet office setting.

Table 17-2.
24-hour Sound Level Measurement at LT-1 (dBA)

Date	Time (Hour-Starting)	L_{eq}	L_{max}	L_{10}	L_{50}	L_{90}	L_{min}
12/28/2011	10:00:00	44.0	69.3	42.9	39.5	36.7	34.0
12/28/2011	11:00:00	57.2	82.6	47.1	38.1	34.2	32.2
12/28/2011	12:00:00	55.4	80.5	50.1	36.7	32.3	30.6
12/28/2011	13:00:00	48.2	71.4	47.7	38.5	33.8	30.8
12/28/2011	14:00:00	36.2	49.8	38.9	34.8	31.0	28.2
12/28/2011	15:00:00	43.1	70.5	42.1	35.6	31.2	27.0
12/28/2011	16:00:00	43.9	67.8	45.1	38.5	34.0	28.6
12/28/2011	17:00:00	42.6	71.9	40.5	34.8	29.9	28.0
12/28/2011	18:00:00	45.8	70.7	39.7	36.2	32.6	30.9
12/28/2011	19:00:00	52.0	77.8	41.6	35.4	32.0	28.2
12/28/2011	20:00:00	44.1	69.1	45.7	39.9	30.5	26.6
12/28/2011	21:00:00	49.5	70.4	50.8	44.9	39.9	36.6
12/28/2011	22:00:00	47.3	74.2	49.4	41.7	36.3	26.6
12/28/2011	23:00:00	44.6	56.5	49.3	39.1	30.7	28.5
12/29/2011	0:00:00	44.2	56.1	49.1	38.9	33.8	29.1
12/29/2011	1:00:00	36.6	48.6	40.3	34.1	31.0	28.2
12/29/2011	2:00:00	44.2	57.3	48.2	40.4	32.8	29.8
12/29/2011	3:00:00	46.6	55.8	50.7	42.7	31.9	29.1
12/29/2011	4:00:00	45.0	56.4	49.5	41.2	36.1	29.7
12/29/2011	5:00:00	37.5	50.1	40.7	35.9	30.3	28.8
12/29/2011	6:00:00	49.1	72.3	38.6	33.3	29.9	28.4
12/29/2011	7:00:00	47.6	77.8	39.7	36.2	34.6	33.3
12/29/2011	8:00:00	44.0	60.7	46.2	42.3	39.4	36.0
12/29/2011	9:00:00	46.4	74.7	42.4	38.7	36.3	34.8

Notes:

Measurements conducted on December 28 and 29, 2011. Measurement Location: N 36° 48' 22.4", W 120° 20' 59.3."

24-hour L_{eq} = 48.7 dBA; CNEL = 53.3 dBA; Daytime L_{eq} = 49.9 dBA; Evening L_{eq} = 49.6 dBA; Nighttime L_{eq} = 45.3 dBA

Key:

dBA = A-weighted decibel
L_{eq} = equivalent sound level
L_{max} = maximum sound level
L_{min} = minimum sound level
L_{10} = sound level exceeded 10 percent of the time
L_{50} = sound level exceeded 50 percent of the time
L_{90} = sound level exceeded 90 percent of the time

LT-2

The noise-sensitive receiver located at LT-2 represents a single-family residence on San Mateo Road south of the San Joaquin River in Fresno County. The primary noise sources in the area consisted of traffic, farming activities and barking dogs. Table 17-3 lists the results of the long-term measurement conducted at measurement site LT-2. The average daytime ambient noise level (L_{eq}) was 56.5 dBA and hourly L_{eq} values ranged from 42.8 to 60.5 dBA. The average evening ambient noise level (L_{eq}) was 47.1 dBA and hourly L_{eq} values ranged from 40.3 to 49.9 dBA. The average nighttime ambient noise level (L_{eq}) was 45.6 dBA and hourly L_{eq} values ranged from 27.9 to 52.1 dBA. The difference between the daytime and nighttime L_{eq} is 10.9 dBA, which is due to farming equipment activities and barking dogs during daytime hours. The ambient noise level in this area is equivalent to an office setting or a quiet room.

Table 17-3.
24-hour Sound Level Measurement at LT-2 (dBA)

Date	Time (Hour-Starting)	L_{eq}	L_{max}	L_{10}	L_{50}	L_{90}	L_{min}
12/28/2011	10:00:00	59.9	88.5	44.8	38.9	37.0	34.9
12/28/2011	11:00:00	59.9	88.5	45.5	35.3	33.5	31.6
12/28/2011	12:00:00	59.0	88.0	45.1	32.6	30.6	29.5
12/28/2011	13:00:00	60.5	86.2	47.5	34.9	31.8	30.2
12/28/2011	14:00:00	51.2	81.6	38.9	34.5	30.8	27.9
12/28/2011	15:00:00	57.6	87.0	42.5	35.0	31.0	28.9
12/28/2011	16:00:00	57.6	84.9	49.7	38.8	30.6	28.3
12/28/2011	17:00:00	42.8	70.8	40.2	36.0	32.5	28.8
12/28/2011	18:00:00	47.7	76.2	44.2	36.7	33.5	31.8
12/28/2011	19:00:00	40.3	61.9	42.8	35.6	29.2	26.8
12/28/2011	20:00:00	49.9	77.5	52.4	36.4	28.6	26.6
12/28/2011	21:00:00	46.7	68.3	48.6	45.6	37.0	31.0
12/28/2011	22:00:00	49.9	77.1	43.4	31.9	25.9	23.0
12/28/2011	23:00:00	35.6	48.3	40.0	28.9	24.3	23.0
12/29/2011	0:00:00	28.8	51.2	30.2	25.8	24.3	23.1
12/29/2011	1:00:00	27.9	32.2	30.0	27.9	24.8	23.7
12/29/2011	2:00:00	39.9	52.8	44.4	34.3	27.3	25.9
12/29/2011	3:00:00	29.1	40.9	31.3	27.6	26.6	25.5
12/29/2011	4:00:00	36.8	44.6	40.7	34.9	28.2	26.2
12/29/2011	5:00:00	46.6	76.2	40.4	36.9	34.6	32.9
12/29/2011	6:00:00	52.1	72.1	50.6	39.7	34.0	31.8
12/29/2011	7:00:00	45.6	71.6	45.9	43.0	37.9	34.5
12/29/2011	8:00:00	46.9	66.8	48.2	43.6	39.2	37.1
12/29/2011	9:00:00	47.4	74.4	48.2	43.5	37.0	34.4

Notes:

Measurements conducted on December 28 and 29, 2011. Measurement Location: N 36° 46' 17.8", W 120° 18' 51.3."

24-hour L_{eq} = 53.9 dBA; CNEL = 55.8 dBA; Daytime L_{eq} = 56.5 dBA; Evening L_{eq} = 47.1 dBA; Nighttime L_{eq} = 45.6 dB

Key:
dBA = A-weighted decibel
L_{eq} = equivalent sound level
L_{max} = maximum sound level
L_{min} = minimum sound level
L_{10} = sound level exceeded 10 percent of the time
L_{50} = sound level exceeded 50 percent of the time
L_{90} = sound level exceeded 90 percent of the time

LT-3

The noise-sensitive receiver located at LT-3 represents a single-family residence at the north end of Bass Avenue. The noise-sensitive receiver is located north of the city of Mendota within an unincorporated area of Fresno County and on the northwest side of the San Joaquin River. The sound level meter was mounted on a tree at the north end of Bass Avenue. The primary noise sources in the area consisted of local traffic at the homes and barking dogs. Table 17-4 lists the results of the long-term measurement conducted at measurement site LT-3.

Table 17-4.
24-hour Sound Level Measurement at LT-3 (dBA)

Date	Time (Hour-Starting)	L_{eq}	L_{max}	L_{10}	L_{50}	L_{90}	L_{min}
12/28/2011	10:00:00	46.4	76.1	43.1	38.9	36.9	34.1
12/28/2011	11:00:00	35.6	53.6	37.6	34.0	31.7	29.9
12/28/2011	12:00:00	43.5	66.2	38.0	33.3	31.3	29.4
12/28/2011	13:00:00	36.3	58.3	36.4	31.8	29.6	27.8
12/28/2011	14:00:00	39.6	60.7	37.4	31.9	29.8	27.8
12/28/2011	15:00:00	36.9	52.7	39.6	32.2	30.0	27.2
12/28/2011	16:00:00	40.0	56.2	42.5	37.2	28.5	25.9
12/28/2011	17:00:00	37.9	65.9	37.6	28.9	27.0	25.1
12/28/2011	18:00:00	36.7	59.9	35.4	29.5	26.7	24.1
12/28/2011	19:00:00	31.2	49.4	34.9	25.8	23.2	21.3
12/28/2011	20:00:00	34.1	56.8	33.5	29.2	25.2	22.8
12/28/2011	21:00:00	34.8	45.3	39.4	32.1	28.7	26.6
12/28/2011	22:00:00	31.2	44.0	33.4	29.3	26.7	22.6
12/28/2011	23:00:00	27.4	43.3	28.7	26.5	24.9	23.5
12/29/2011	0:00:00	33.2	56.4	30.3	27.6	26.2	24.9
12/29/2011	1:00:00	28.1	43.3	29.9	27.3	26.2	24.2
12/29/2011	2:00:00	31.7	49.0	33.1	31.3	29.0	26.8
12/28/2011	3:00:00	30.5	47.3	31.8	29.8	28.3	26.6
12/29/2011	4:00:00	32.4	47.2	34.2	31.8	29.7	28.4
12/29/2011	5:00:00	33.9	41.2	35.8	33.6	30.8	28.4
12/29/2011	6:00:00	36.8	49.6	39.8	35.1	33.1	31.8
12/29/2011	7:00:00	41.0	62.7	43.3	37.4	34.6	32.5
12/29/2011	8:00:00	42.6	70.1	43.0	39.6	36.7	35.1
12/29/2011	9:00:00	38.7	50.9	40.7	37.7	35.9	34.4

Notes:

Measurements conducted on December 28 and 29, 2011. Measurement Location: N 36° 47' 32.6", W 120° 22' 18.5."

24-hour L_{eq} = 38.5 dBA; CNEL = 41.2 dBA; Daytime L_{eq} = 40.9 dBA; Evening L_{eq} = 33.6 dBA; Nighttime L_{eq} = 32.5 dBA

Key:

dBA = A-weighted decibel

L_{eq} = equivalent sound level

L_{max} = maximum sound level

L_{min} = minimum sound level

L_{10} = sound level exceeded 10 percent of the time

L_{50} = sound level exceeded 50 percent of the time

L_{90} = sound level exceeded 90 percent of the time

The average daytime ambient noise level (L_{eq}) was 40.9 dBA and hourly L_{eq} values ranged from 35.6 to 46.4 dBA. The average evening ambient noise level (L_{eq}) was 33.6 dBA and hourly L_{eq} values ranged from 31.2 to 34.8 dBA. The average nighttime ambient noise level (L_{eq}) was 32.5 dBA and hourly L_{eq} values ranged from 27.4 to 36.8 dBA. The difference between the daytime and nighttime L_{eq} is 8.4 dBA, which is to be expected for an isolated environment with limited human activity. This very quiet ambient noise level in this area is equivalent to whispering or a faint hum from a refrigerator.

ST-1

The noise-sensitive receiver located at ST-1 represents the Mendota Pool Park located within the city of Mendota in an unincorporated area of Fresno County. The sound level meter was mounted to a tripod for daytime, evening and nighttime measurements. The primary noise sources in the park consisted of passing traffic on Bass Road, traffic driving through the park, birds chirping, distant traffic and a distant power plant during the evening and nighttime measurement periods. Table 17-5 lists the results of the short-term measurement conducted at measurement site ST-1. The average daytime ambient noise level (L_{eq}) was found to be 41.3 dBA. The average evening ambient noise level (L_{eq}) was found to be 38.6 dBA. The average nighttime ambient noise level (L_{eq}) was found to be 35.4 dBA. The difference between the daytime and nighttime L_{eq} is 5.9 dBA, which is to be expected for an isolated environment with limited human activity. This very quiet ambient noise level in this area is equivalent to whispering or a refrigerator humming.

Table 17-5.
Short-Term Sound Level Measurements at ST-1 (dBA)

Date	Start Time	End Time	L_{eq}	L_{10}	L_{50}	L_{90}
12/28/2011	10:30:00	12:30:00	41.3	43.6	36.1	31.3
12/28/2011	20:00:00	22:00:00	38.6	35.2	31.1	27.5
12/28/2011	23:00:00	1:00:00	35.4	36.3	33.2	30.8

Notes:

Measurements conducted on December 28 and 29, 2011. Measurement Location: N 36° 46' 43.6", W 120° 22' 23.7."

24-hour L_{eq} = 39.0 dBA; CNEL = 43.7 dBA; Daytime L_{eq} = 41.3 dBA; Evening L_{eq} = 38.6 dBA; Nighttime L_{eq} = 35.4 dBA

Key:

dBA = A-weighted decibel

L_{eq} = equivalent sound level

L_{10} = sound level exceeded 10 percent of the time

L_{50} = sound level exceeded 50 percent of the time

L_{90} = sound level exceeded 90 percent of the time

17.2 Regulatory Setting

Applicable laws, ordinances, regulations or standards and noise guidelines are used at the local level for planning purposes. Local noise guidelines are often based on the broader guidelines of State and Federal agencies and many are implemented as enforceable noise ordinances. Laws, ordinances, regulations or standards that are applicable to the Project are presented in this section.

17.2.1 Federal

There are a number of laws and guidelines at the Federal level that direct the consideration of a broad range of noise and vibration issues. For perspective, several of the more significant noise-related Federal regulations and guidelines are provided below:

Noise Control Act of 1972 (42 United States Code [USC] 4910)

This Act establishes a national policy to promote an environment free from noise that jeopardizes human health and welfare. To accomplish this, the Act establishes a means for the coordination of Federal research and activities in noise control, authorizes the establishment of Federal noise emissions standards for products distributed in commerce, and provides information to the public respecting the noise emission and noise reduction characteristics of such products.

U.S. Environmental Protection Agency (EPA) Levels Document

In response to a Federal mandate, EPA provided recommendations in *Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety,* NTIS 550\9-74-004 (EPA 1974). The guidance in this document, commonly referenced as the "Levels Document," establishes an L_{dn} of 55 dBA as the requisite level, with an adequate margin of safety, for areas of outdoor uses including residences and recreation areas. This document does not constitute EPA regulations or standards but identifies safe levels of environmental noise exposure without consideration for methods of achieving these levels or other potentially relevant considerations. It is intended to "provide State and local governments as well as the Federal government and the private sector with an informational point of departure for the purpose of decision making." EPA is careful to stress that the recommendations contain a factor of safety and do not consider technical or economic feasibility issues and therefore should not be construed as standards or regulations. This document is generally considered the most relevant Federal guidelines applicable to community noise exposure.

Federal Highway Administration Noise Abatement Procedures (23 Code of Federal Regulations [CFR] Part 772)

The purpose of 23 CFR Part 772 is to provide procedures for noise studies and noise abatement measures to help protect public health and welfare, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways. It establishes five categories of noise sensitive receptors and prescribes the use of the hourly L_{eq} as the criterion metric for evaluating traffic noise impacts.

Occupational Safety and Health Administration (OSHA) Occupational Noise Exposure; Hearing Conservation Amendment (Federal Register [FR] 48 (46), 9738 – 9785 (1983).

The OSHA standard stipulates that protection against the effects of noise exposure are required for employees when sound levels exceed 90 dBA over an 8-hour exposure period. Protection would consist of feasible administrative or engineering controls. If such controls fail to reduce sound levels to within acceptable levels, personal protective equipment would be provided and used to reduce exposure of the employee. Additionally, a Hearing Conservation Program must be instituted by the employers

whenever employee noise exposure equals or exceeds the action level of an 8-hour time-weighted average sound level of 85 dBA. The Hearing Conservation Program requirements consist of periodic area and personal noise monitoring, performance and evaluation of audiograms, provision of hearing protection, annual employee training, and record keeping.

Federal Transit Administration

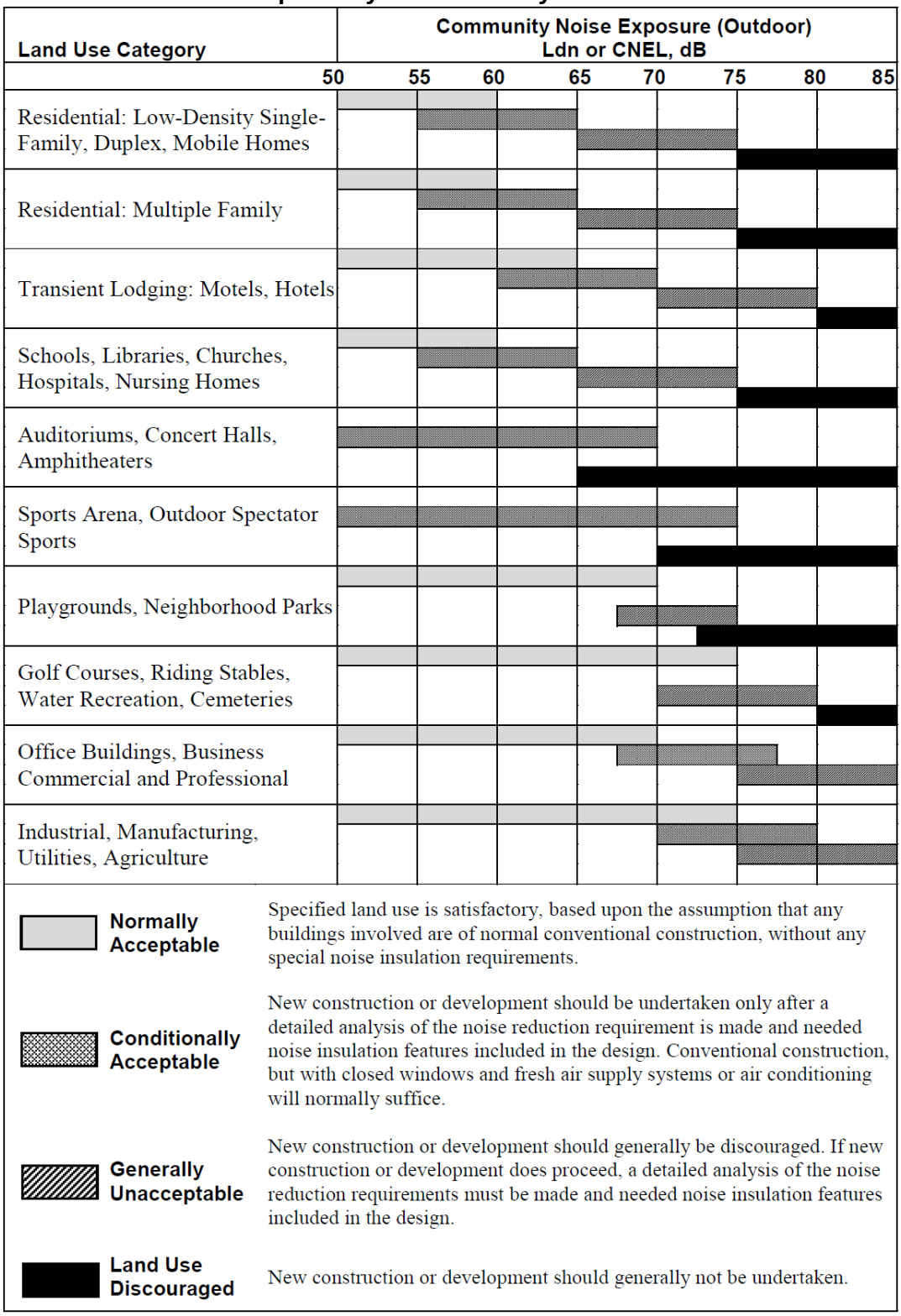
To address the human response to groundborne vibration, FTA has set forth guidelines for criteria related to maximum acceptable vibration for different types of land uses. For frequent events, these include 65 VdB for land uses where low ambient vibration is essential for interior operations (e.g., hospitals, high-technology manufacturing, and laboratory facilities), 72 VdB for residential uses and buildings where people normally sleep, and 75 VdB for institutional land uses with primarily daytime operations (e.g., schools, churches, clinics, and offices) (FTA 2006).

Standards have also been established to address the potential for groundborne vibration to cause structural damage to buildings. These standards were developed by the Committee of Hearing, Bioacoustics, and Biomechanics at the request of EPA (FTA 2006). For fragile structures, the Committee of Hearing, Bioacoustics, and Biomechanics recommends a maximum limit of 0.25 in/sec peak particle velocity (FTA 2006). Peak particle velocity is a measure of the intensity of ground vibration, specifically the time rate of change of the amplitude of ground vibration.

17.2.2 State of California

The State establishes noise compatibility guidelines. These guidelines are used to ensure compatible noise levels at various noise sensitive land uses from transportation related noise sources related to new projects. Land use categories and their corresponding maximum allowable noise exposure levels (in terms of CNEL) can be found in Table 17-6. As shown in Table 17-6, the maximum allowable noise exposure level for residential land use is 60 dBA CNEL.

Table 17-6.
Land Use Compatibility of Community Noise Environments



Source: Fresno County 2000: Chart HS-1 of the Fresno County Health and Safety Element

17.2.3 Regional and Local

Fresno County

Noise level limits associated with fixed noise sources are found in the Fresno County Noise Ordinance. These limits are presented in Table 17-7. The noise standards found in Table 17-7 applies to all residences, schools, hospitals, churches, and public libraries. Table 17-7 lists the exterior noise standards by time of exposure within a one-hour time period. A 50 dBA L_{50} is the daytime baseline criterion noise level and a 45 dBA L_{50} is the nighttime baseline noise criterion. Impulsive, or pure tone, noise is penalized by a reduction of 5 dBA for each noise standard. In Fresno County, construction noise is exempt from local noise standards on weekdays from 6:00 a.m. to 9:00 p.m. and on Saturday and Sunday from 7:00 a.m. to 5:00 p.m.

Table 17-7.
Fresno County Exterior Noise Level Standards for Noise-Sensitive Land Uses Affected by Non-Transportation Noise Sources (dBA)

Cumulative Number of Minutes in Any 1-Hour Period	Corresponding $L_{percent}$	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
30	L_{50}	50	45
15	L_{25}	55	50
5	$L_{8.3}$	60	55
1	$L_{1.7}$	65	60
0	-	70	65

Source: Fresno County 1978
Key: dBA = A-weighted decibels

Madera County

Madera County establishes local exterior noise level limits from non-transportation noise sources in the Madera County Noise Element. Noise level limits associated with fixed noise sources are found in Table 17-8. The noise standards found in Table 17-8 apply to all residences, transient lodging, churches, meeting halls, schools, theaters, auditoriums, music halls, hospitals, nursing homes, office buildings, museums, playgrounds, parks, and public libraries. A 50 dBA L_{eq} is the daytime baseline criterion noise level and a 45 dBA L_{eq} is the nighttime baseline noise criterion. Impulsive, or pure tone, noise is penalized by a reduction of 5 dBA for each noise standard. In Madera County, construction noise is exempt from local noise standards on weekdays from 7:00 a.m. to 7:00 p.m. and on Saturday from 9:00 a.m. to 5:00 p.m. Construction noise is not exempt from noise standards on Sundays.

Table 17-8.
Madera County Exterior Noise Level Standards for Noise-Sensitive Land Uses Affected by Non-Transportation Noise Sources (dBA)

Noise Level Descriptor	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
Hourly Average (L_{eq}), dBA	50	45
Maximum (L_{max}), dBA	70	65

Source: Madera County 1995
Key: dBA = A-weighted decibels

City of Mendota

The city of Mendota (2009) establishes local exterior noise level limits in the city of Mendota Noise Element. Noise level limits associated with fixed noise sources are found in Table 17-9. The noise standards found in Table 17-9 apply to all residences, transient lodging, churches, meeting halls, schools, theaters, auditoriums, music halls, hospitals, nursing homes, office buildings, museums, playgrounds, parks, and public libraries. A 55 dBA L_{eq} is the daytime baseline criterion noise level, a 50 dBA L_{eq} is the evening baseline criterion noise level, and a 45 dBA L_{eq} is the nighttime baseline noise criterion. Impulsive, or pure tone, noise is penalized by a reduction of 5 dBA for each noise standard.

The city of Mendota's (2010) Excessive Noise Standard states that between the hours of 10:00 p.m. and 7:00 a.m., operation of equipment or performance of any outside construction or repair work on buildings, structures or projects or operations of construction type device is not allowed if the activity takes place within 500 feet of any residential zone. Noise generated by construction activities are required to be limited to the daytime hours between 7:00 a.m. and 7:00 p.m. and are prohibited on Federal holidays. If nighttime construction activities are necessary, the city of Mendota's Public Works director would need to be contacted.

Table 17-9.
City of Mendota Exterior Noise Level Standards for Noise-Sensitive Land Uses Affected by Non-Transportation Noise Sources (dBA)

Noise Level Descriptor	Daytime (7:00 a.m. to 7:00 p.m.)	Evening (7:00 p.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
Hourly Average (L_{eq}), dBA	55	50	45
Maximum (L_{max}), dBA	70	60	55

Source: City of Mendota 2009
Key: dBA = A-weighted decibels

17.3 Environmental Consequences and Mitigation Measures

17.3.1 Impact Assessment Methodology

This section describes the methodology used to determine potential noise impacts generated by noise and vibration associated with construction activities, increased off-site traffic, and operational activities related to the Project. The noise impact assessment is based on four potential Project Alternatives: Alternative A (Compact Alignment Bypass with Narrow Floodplain and South Canal), Alternative B (Compact Alignment Bypass with Consensus-Based Floodplain and Bifurcation Structure), Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal) and Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal).

Construction Noise Related Effects on Sensitive Receivers Noise levels generated by construction activities associated with Alternatives A, B, C and D at nearby noise-sensitive receptors were evaluated using the FTA's Transit Noise and Vibration Impact Assessment (FTA 2006). Noise levels for each type of construction equipment that would be used throughout the duration of construction for the Project were derived from the Federal Highway Administration's (FHWA's) Road Construction Noise Model. Table 17-10 lists the noise emission levels at a distance of 50 feet from the source for each type of construction equipment that would be used during the construction phase of the Project.

Table 17-10.
Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 feet from Source
Air Compressor (Sullair 125)	78
Asphalt Paver	77
Compactor Cat 815	83
Compactor Cat 825	83
Concrete Pump Mack Truck & 36-47M Pump	81
Crane Grove RT990	81
Double Bottom Dump Truck (25 TN)	76
Dozer Cat D10	82
Dozer Cat D6	82
Dozer Cat D8	82
Excavator Cat 330L	81
Excavator Cat 345	81
Excavator with Auger Attachment Cat 330L	81
Excavator with Driver Attachment Cat 330L	81
Flatrack Truck	74
Fork Lift Cat TH560B Telescopic Handler	75
Hydraulic Pile Driver Power Bruce PQ-700V	101
Hydraulic Pile Hammer Driver Bruce SGH-4212	101
Loader Cat 966	79

Table 17-10.
Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 feet from Source
Loader JD 210C 4x4 (Cat 416)	79
Loader/Backhoe JD 710 (Cat 446)	79
Low Bed Truck	74
Motor Grader Cat 14H	85
Pickup	75
Roller 7-9 Ton	80
Scraper Cat 623	84
Scraper Cat 657 Push-Pull	84
Semi End Dump Truck (25 TN)	76
Sheet Pile Driver Power Bruce PQ-700V	101
Skid Steer Loader Cat 277B	79
Street Sweeper/Pickup Broom	82
Transfer Truck (25 TN)	76
Vibratory Sheet Pile Driver Bruce SGV-500	101
Water Truck (4,000 Gal)	76

Note: Construction equipment inventory was developed by the California Department of Water Resources for the appraisal-level designs.

Emission levels from the FHWA Road Construction Noise Model and usage factors for construction equipment were used in order to calculate an L_{eq} for the loudest construction activity within each designated group for all four Project alternatives. If the specific equipment was not found in the Road Construction Noise Model, then the emission level of similar equipment was used.

The following equation calculates the resulting L_{eq} at a sensitive receiver for an individual piece of construction equipment. This formula is used to adjust the noise level generated by the individual piece of construction equipment based on the estimated time that it is planned to be used during an hour.

$$L_{eq}(equip) = E.L. + 10\log(U.F.)$$

where:

$L_{eq}(equip)$ = L_{eq} at a receiver resulting from the operation of a single piece of equipment over a specified time period.

E.L .= noise emission level of the particular piece of equipment at a reference distance of 50 feet (found in Table 17-10).

U.F. = usage factor that accounts for the fraction of time that the equipment is in use over the specified period of time.

The FTA's General Assessment for construction noise assumes that the two loudest pieces of equipment are operating simultaneously for each construction activity. The associated noise level, in terms of L_{eq}, was calculated for each type of construction activity, and the distance to the daytime 50 dBA L_{eq} and nighttime 45 dBA L_{eq} noise contours was derived. Local noise standards are based on L_{50} and L_{eq} noise standards. In order to generate a conservative estimate for potential noise impacts, the L_{eq} noise standards were used as the local noise standard threshold for noise impacts as a worst-case scenario because an L_{eq} noise standard is more stringent and it assumes a steady-state noise level from construction equipment. Appendix 17-C lists the associated noise levels for each construction activity, in addition to listing the distances to the nighttime 45 dBA and daytime 50 dBA L_{eq} noise contours.

Additional modeled noise-sensitive receivers were added to the noise model where ambient noise level measurements were not conducted. Figure 17-2 depicts the location of all ambient noise measurement locations in addition to the modeled receiver locations. There are four residences located approximately 500 feet west of LT-1. These four residences are identified as Modeled Receiver 4 (R-4) and referenced as such throughout the analysis. There are several homes located near LT-2. R-5 is a single-family home located near Little San Joaquin Slough. R-6 is a single-family home located approximately 3,500 feet south of LT-2 along San Mateo Avenue. R-7 is two single-family homes located approximately 1,000 feet south of LT-2 along San Mateo Avenue. There are also several homes located near LT-3. R-2 is a group of homes located approximately 3,700 feet northwest of LT-3. R-3 is a group of homes located approximately 2,000 feet northwest of LT-3. R-1 is a group of homes located along Bass Avenue.

Due to the size of the Project footprint, the amount of equipment, and the non-stationary nature of the construction activities, it is difficult to estimate an exact location where construction equipment would be situated. In order to determine the minimum allowable distance to each construction activity for each noise-sensitive receiver, the maximum allowable hourly L_{eq} values for each construction activity for each Alternative were calculated. It was also assumed for the purpose of calculating an hourly L_{eq} noise level for each construction activity that the two loudest pieces of equipment were operating simultaneously. These noise levels were then used to calculate the distances to the daytime 50 dBA L_{eq} and nighttime 45 dBA L_{eq} noise contours.

The potential for noise to impact wildlife is addressed in Section 7.0, Biological Resources–Wildlife.

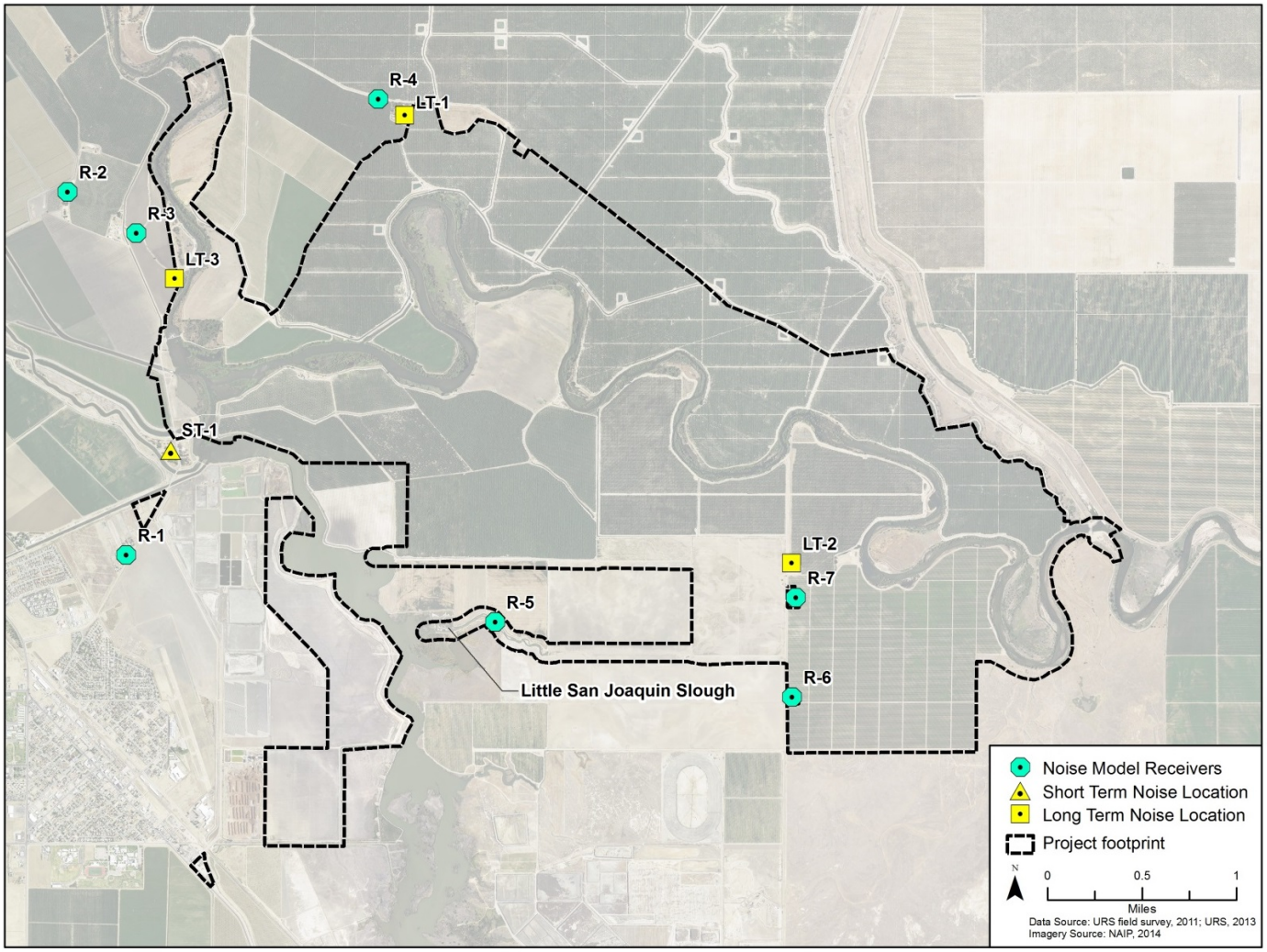


Figure 17-2.
Ambient Noise Level Measurement and Modeled Receiver Locations

Construction Vibration Related Effects on Sensitive Receptors

Table 17-11 is reproduced from Table 12-2 of the FTA Manual (2006) and it lists vibration source levels for typical construction equipment. Impact pile driving activities would be conducted during the construction of Project components and the vibration source level listed for impact pile drivers (104 VdB at a distance of 25 feet) is the reference level that is used for estimating potential annoyance generated by pile driving activities.

Table 17-11.
Vibration Source Levels for Construction Equipment

Equipment		Peak particle velocity at 25 ft (in/sec)	Approximate RMS vibration velocity at 25 ft (VdB)
Pile Driver (impact)	upper range	1.518	112
	typical	0.644	104
Pile Driver (sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

Source: FTA 2006

Key:
RMS = root mean square velocity
VdB = vibration decibels

It is assumed, as a worst-case scenario for ground-borne vibration levels, that more than 70 vibration events would be conducted per day during pile driving activities. Utilizing this assumption results in a vibration standard of 72 VdB at residences and buildings where people normally sleep. Using the reference level of 104 VdB at a distance of 25 feet, the distance to 72 VdB was be calculated. Vibration-sensitive receivers within this calculated distance may be subjected to vibration levels that could cause annoyance and have an adverse effect.

Off-site Vehicular Traffic Noise Effects due to Construction-Related Trips

Acoustic calculations were performed for noise generated by traffic during construction activities related to Project alternatives. The access routes to the Project area were assumed to be along Bass Avenue, San Mateo Avenue, State Route (SR)-180, and SR-33 (north and south of the SR-180/33 junction).

Average daily traffic (ADT) volumes and traffic mixes for each roadway segment were taken from the California Department of Transportation (Caltrans) Operational Traffic Data Branch during the year 2011, which was used to represent existing conditions (Caltrans 2011).[2] An estimated 2035 ADT was used to represent the No-Action Alternative. A traffic growth rate of 1 percent per year starting from 2011 was used to estimate the 2035 ADT.

For Alternatives A through D, it was assumed that: (1) all construction workers going to the Project site would originate from the construction office, which is located on the southwest corner of the Project area; (2) construction workers would generate 200 trips (100 round trips) going to and from the construction office each day throughout the full duration of the construction phase of the Project; and (3) workers would be traveling along Bass Avenue, SR-180 and SR-33 (north and south of the SR-180/33 junction). During the construction phase of the Project, heavy trucks would haul off-site materials to and from the stockpile staging area located on the southeast corner of the Project area along San Mateo Avenue. The ADT for heavy trucks was derived using construction schedules and estimates of truck trips developed by California Department of Water Resources (DWR) for the appraisal-level designs.

The traffic noise prediction equations derived by the FHWA were used to estimate the CNEL for existing conditions, the No-Action Alternative and Alternatives A through D at 50 feet from each respective roadway segment. The estimated CNEL for each alternative was individually compared to the No-Action Alternative and existing conditions, respectively, to determine the change in CNEL for each alternative. For this traffic noise analysis, a change of 5 dBA CNEL at 50 feet from a roadway segment is considered to be an impact.

Noise Effects due to Operation and Maintenance Activities

Increases in Project-related ADT volumes were estimated for operational and maintenance activities to evaluate potential Project-related changes in traffic noise. Vehicle traffic would be associated with operation and maintenance activities such as inspection and adjustment of water control structure gates, inspection and cleaning of fish screens, fish barriers, and fish ladders, inspection of gates at Mendota Dam, installation and removal of flashboards at Mendota Dam, sediment removal from channels and canals, and removal of debris from culverts. Operation and maintenance-related traffic were compared to ambient traffic along access routes leading into the Project area to assess effect on nearby noise sensitive receivers.

17.3.2 Significance Criteria

The most restrictive noise level limits at noise-sensitive receivers in the Project area and vicinity during daytime and nighttime hours are Fresno County's exterior noise standards. For noise-sensitive receivers located in the Project area, the daytime noise standard of 50 dBA L_{50} and nighttime standard of 45 dBA L_{50} are the applicable noise standards at nearby noise-sensitive receivers. Madera County and city of Mendota use L_{eq} values.

[2] Although the Notice of Intent/Notice of Preparation was filed in 2009, traffic counts from 2011 were used to represent existing conditions. There was no significant increase in traffic volume between these 2 years.

Because the usage factor that is applied to construction activities throughout the noise analysis, the L_{50} and L_{eq} noise metrics are considered to be equivalent. Fresno County's Noise Ordinance, Madera County's Noise Ordinance, and the city of Mendota's Noise Element have different construction noise exempt times. All three jurisdictions' construction noise exempt times have been taken into consideration in order to generate one set of construction noise exempt times so that no individual jurisdiction's regulations regarding construction noise exempt times are violated. Construction noise for the Project would be exempt from local noise standards in all relevant jurisdictions on weekdays from 7:00 a.m. to 7:00 p.m. and on Saturday from 9:00 a.m. to 5:00 p.m. Construction noise is prohibited on Federal holidays. Construction activities conducted on Sundays would have to meet the daytime and nighttime noise standards.

California Environmental Quality Act (CEQA) guidelines and thresholds require that significant environmental impacts be identified and that these impacts be eliminated or mitigated to the extent feasible. According to CEQA, resource impact assessment involves the comparison of existing or "baseline" conditions with Project conditions. Section XI of Appendix G of the State CEQA Guidelines (Cal. Code Regs., tit. 14, Appendix G) sets forth characteristics that may signal a potentially significant impact. The following thresholds for determining the significance of impacts related to noise are contained in the Environmental Checklist Form in Appendix G of the State CEQA Guidelines, as amended. Under National Environmental Policy Act (NEPA) Council on Environmental Quality Regulations, effects must be evaluated in terms of their context and intensity. These factors have been considered when applying the CEQA Guidelines. The State CEQA Guidelines ask whether a proposed project would result in:

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
- Exposure of people residing or working in the project area to excessive noise levels for a project located within an airport land use plan, or where such a plan has not been adopted, within 2 miles of a public airport or public use airport, or for a project within the vicinity of a private airstrip.

The State CEQA Guidelines do not provide a definition for "substantial increase" in noise and they do not provide a threshold of significance for potential noise or vibration impacts. Therefore, the effects from noise and vibration would be considered when above the following thresholds. These thresholds apply to both the proposed project's impacts for all of the project alternatives and cumulative impacts.

Changes in a noise level of less than 3 dBA are not typically noticed by the human ear. Some individuals who are extremely sensitive to changes in noise may notice changes from 3 to 5 dBA. Based on this information, the following thresholds have been used to evaluate effects for both long-term, permanent increases and temporary or periodic increases in ambient noise levels:

- An increase of 3 dBA or greater in noise level that occurs due to Project-related activities would be significant if the resulting noise levels would cause local noise standards to be exceeded, or result in a 3 dBA increase in noise to a land use experiencing levels above local noise compatibility thresholds of "normally acceptable." A noise level increase of less than 3 dBA under either of the previously described scenarios is not considered to be significant.
- An increase of 5 dBA or less in noise level that occurs from Project-related activities would not be considered significant if the resulting noise levels remain below the "acceptable" thresholds established by local standards.
- Increases in noise greater than 5 dBA would be considered significant if the resulting noise levels are above local standards.
- Otherwise the effects of increasing noise levels greater than 5 dBA due to Project-related activities would be evaluated by comparison to other applicable guidelines.

The effects of temporary, short-, and long-term ground-borne vibration due to Project-related activities have been evaluated qualitatively where Project implementation would generate or result in the exposure of sensitive receptors to vibration levels that exceed FTA's vibration standard of 72 VdB. The ground-borne vibration and ground-borne noise impact criteria for general assessments are described in Table 8-1 of the FTA Manual (2006). This table is reproduced below as Table 17-12.

Table 17-12.
Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for General Assessment

Land Use Category	Ground-Borne Vibration Impact Levels (VdB)			Ground-Borne Noise Impact Levels (dB)		
	Frequent Events	Occasional Events	Infrequent Events	Frequent Events	Occasional Events	Infrequent Events
Category 1: Buildings where vibrations would interfere with interior operations	65	65	65	NA	NA	NA
Category 2: Residences and buildings where people normally sleep	72	75	80	35	38	43
Category 3: Institutional land uses with primary daytime use	75	78	83	40	43	48

Source: FTA 2006

Notes:

Frequent events are defined as more than 70 vibration events of the same source per day.

Occasional events are defined as 30 to 70 vibration events of the same source per day.

Infrequent events are defined as fewer than 30 vibration events of the same kind per day.

17.3.3 Impacts and Mitigation Measures

This section provides an evaluation of direct and indirect effects of the Project alternatives on noise sensitive receivers. It includes analyses of potential effects relative to the No-Action Alternative in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. The analysis is organized by Project alternative with specific impact topics numbered sequentially under each alternative. With respect to noise and vibration, the environmental impact issues and concerns are:

1. Exposure of Sensitive Receptors to Temporary Construction Noise.
2. Exposure of Sensitive Receptors to Temporary Construction Vibration.
3. Increased Off-site Vehicular Traffic Noise due to Construction Related Trips.
4. Noise Effects due to Operation and Maintenance Activities.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the San Joaquin River Restoration Program (SJRRP) would be implemented, including habitat restoration in other reaches, augmentation of river

flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these Program-level activities would not achieve Settlement goals. The analysis is a comparison to existing conditions, and no mitigation is required for the No-Action Alternative.

Impact NOI-1 (No-Action Alternative): *Exposure of Sensitive Receptors to Temporary Construction Noise.* Under the No-Action Alterative, the Project would not be implemented and there would be no short-term construction activities in the Project area. In addition, there would be no construction equipment or construction related activities in the Project area. As a result, there would be **no impact** on any nearby existing noise sensitive receptors.

Impact NOI-2 (No-Action Alternative): *Exposure of Sensitive Receptors to Temporary Construction Vibration.* Under the No-Action Alterative, the Project would not be implemented and there would be no short-term construction activities in the Project area. In addition, there would be no construction equipment or construction related activities in the Project area. As a result, there would be **no impact** on any nearby existing vibration sensitive receptors.

Impact NOI-3 (No-Action Alternative): *Increased Off-Site Vehicular Traffic Noise due to Construction Related Trips.* Under the No-Action Alternative, the Project would not be implemented and there would be no short-term construction activities in the Project area. In addition, there would be no construction-related vehicular trips going to and from the Project area. Table 17-13, shown below, shows the change in CNEL between existing conditions and the No-Action Alternative as a result of traffic conditions would be less than 1 dBA CNEL. As a result, there would be a **less than significant** impact.

Table 17-13.
Change in Traffic Noise between Existing Conditions and No-Action Alternative

Road Segments	Speed Limit (mph)	Existing (2009)		No-Action (2035)		Change in CNEL (dBA)
		ADT	CNEL (dBA) at 50 feet (feet)	ADT	CNEL (dBA) at 50 feet (feet)	
Bass Avenue east of SR-33	25	510	50	632	50	1
San Mateo Road north of SR-180	25	547	50	678	51	1
SR-33 south of SR-180/33 Junction	55	11,800	73	14632	74	1
SR-33 north of SR-180/33 Junction	55	5,600	71	6944	72	1
SR-180 west of San Mateo Avenue	55	8,200	70	10168	71	1
SR-180 east of San Mateo Avenue	55	8,200	70	10168	71	1

ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel(s)
mph = miles per hour

Impact NOI-4 (No-Action Alternative): ***Noise Effects due to Operations and Maintenance Activities.*** Under the No-Action Alterative, the Project would not be implemented and there would be no operation and maintenance activities in the Project area. In addition, there would be no operation and maintenance related vehicular trips going to and from the Project area. As a result, there would be a **no impact** due to increases in off-site vehicular traffic.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would entail construction of new Project facilities, including a new levee system to establish a bypass channel to the north/east of the existing river channel. Other key features include construction of a fish barrier below Mendota Dam, the Mendota Pool Dike (separating the San Joaquin River and Mendota Pool), and the South Canal and South Canal bifurcation structure further upstream. No construction activities are proposed at or near Mendota Dam, which falls outside the Project boundary under Alternative A. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Impact NOI-1 (Alternative A): ***Exposure of Sensitive Receptors to Temporary Construction Noise.*** Compared to the No-Action Alternative, construction activities associated with Alternative A have the potential to generate a short-term increase in noise on the surrounding environs. The loudest construction activities that would be conducted during Alternative A would be the construction of the Compact Bypass grade control structures, South Canal bifurcation structure, fish passage facilities, fish screens, and a fish barrier where the use of pile driving equipment is expected or possible. Appendix 17-C lists the distances to the daytime 50 and nighttime 45 dBA L_{eq} noise contours for all groups of construction activities that originate from the Project construction activities that would be conducted for Alternative A. Although the majority of the construction activities are anticipated to be conducted during construction noise exempt hours (weekdays 7:00 a.m. to 7:00 p.m., Saturday 9:00 a.m. to 5:00 p.m.), nighttime construction may occur. Construction activities associated with Alternative A have the potential to generate temporary adverse effects at noise-sensitive receivers if construction activities are conducted within the daytime 50 dBA L_{eq} or nighttime 45 dBA L_{eq} noise contours during nights and weekends (outside of the construction noise exempt hours).

When comparing Alternative A to existing conditions, impacts to noise would be similar to those discussed in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). Depending on the construction activity, distances to the daytime 50 dBA L_{eq} noise contours range from 2,500 to 21,700 feet and the nighttime 45 dBA L_{eq} noise contours range from 4,400 to 38,600 feet. Although the majority of the construction activities are anticipated to be conducted during the daytime and during construction noise exempt hours, nighttime construction may occur. Construction activities associated with Alternative A would generate a **potentially significant** impact.

Mitigation Measure NOI-1 (Alternative A): ***Reduce Temporary and Short-Term Noise Levels from Construction-Related Equipment Near Sensitive Receptors***. Construction activities in the Project area will be modified to minimize adverse effects to noise sensitive receptors when construction activities occur within daytime 50 dBA Leq

noise contours or nighttime 45 dBA Leq noise contours outside of construction noise exempt hours. Implementation of the following measures would reduce potential construction noise-related impacts to sensitive receptors to a less-than-significant level. This impact would be **less than significant with mitigation**.

Implementation Action: Project proponents will ensure that the following noise-reduction protocols are implemented, as needed, to reduce temporary and short-term construction-related noise impacts near sensitive receptors.

- Equipment will be used as far away as practical from noise-sensitive uses.
- Construction equipment will be properly maintained per manufacturers' specifications and fitted with the best available noise suppression devices (e.g., mufflers, silencers, wraps). All impact tools will be shrouded or shielded, and all intake and exhaust ports on power equipment will be muffled or shielded.
- Equipment that is quieter than standard equipment will be used, including electrically powered equipment instead of internal combustion equipment where use of such equipment is a readily available substitute that accomplishes Project tasks in the same manner as internal combustion equipment.
- Construction site and haul road speed limits will be established and enforced.
- The use of bells, whistles, alarms, and horns will be restricted to safety and warning purposes only.
- Construction equipment will not idle for extended periods of time when not being used during construction activities.
- When construction activities are conducted within 2,000 feet of noise-sensitive uses, noise measurements will be taken at the nearest noise-sensitive land uses relative to construction activities with a sound-level meter that meets the standards of the American National Standards Institute (ANSI Section S14 1979, Type 1 or Type 2). This would allow that construction noise levels to comply with applicable daytime and nighttime noise standards. When construction noise exceeds applicable daytime and nighttime standards, berms, or stockpiles will be used in an attempt to lower noise levels to within acceptable nontransportation standards. If noise levels are still determined to exceed noise standards, temporary barriers will be erected as close to the construction activities as feasible, breaking the line of sight between the source and receptor where noise levels exceed applicable standards. All acoustical barriers would be constructed with material having a minimum surface weight of 2 pounds per square foot or greater and a demonstrated Sound Transmission Class (STC) rating of 25 or greater, as defined by Test Method E90 of the American Society for Testing and Materials. Placement, orientation, size, and density of acoustical barriers will be specified by a qualified engineer.
- A disturbance coordinator will be designated to post contact information in a conspicuous location near the construction site entrance so that it is clearly

visible to nearby receivers. The coordinator will manage complaints resulting from the construction noise. Reoccurring disturbances will be evaluated by a qualified acoustical consultant to ensure compliance with applicable standards. The disturbance coordinator will contact nearby noise-sensitive receptors, advising them of the construction schedule.

Location: Project areas where construction activities will be conducted within 2,000 feet of noise-sensitive receptors.

Effectiveness Criteria: Effectiveness will be based on public complaints to the SJRRP.

Responsible Agency: Reclamation and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and California State Lands Commission (CSLC) monitors.

Timing: Ongoing when construction activities occur outside of construction noise exempt hours.

Impact NOI-2 (Alternative A): ***Exposure of Sensitive Receptors to Temporary Construction Vibration.*** Compared to the No-Action Alternative, vibration levels generated by Project construction activities related to Alternative A have the potential to temporarily increase ground-borne vibration levels near sensitive receptors. Table 17-11 lists vibration source levels for typical construction equipment. Impact pile driving activities would be conducted during the construction of Alternative A and the vibration source level listed for impact pile drivers (104 VdB at a distance of 25 feet) is the reference level that is used for estimating potential annoyance generated by pile driving activities.

It is assumed, as a worst-case scenario for ground-borne vibration levels, that more than 70 vibration events would be conducted per day during pile driving activities. Using this assumption results in a vibration standard of 72 VdB at residences and buildings where people normally sleep. Ground-borne vibration levels generated by pile drivers located less than 300 feet away from sensitive receivers would have an adverse effect on the sensitive receivers. However, all noise-sensitive receivers would be located more than 300 feet away from pile driving activities and effects generated by ground-borne vibration would be minimal.

When comparing Alternative A to existing conditions, impacts to noise would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). All sensitive receivers would be located more than 300 feet away from pile driving activities and there would be a **less than significant** impact.

Impact NOI-3 (Alternative A): ***Increased Off-Site Vehicular Traffic Noise due to Construction Related Trips.*** Compared to the No-Action Alternative, off-site traffic noise levels generated by Project construction worker and truck trips (related to

Alternative A) traveling to and from the Project area have the potential to create a noticeable increase in traffic noise. Tables 17-14 and 17-15 show the change in CNEL (dBA) for the No-Action Alternative (2035) and existing conditions compared to Alternative A, respectively. The largest increase in vehicular traffic noise would be along San Mateo Avenue where three noise-sensitive receivers (LT-2, R-7 and R-6) would experience a traffic noise increase of up to 15 dBA CNEL, as compared to the No-Action Alternative. The increase in traffic noise is the result of construction-related truck traffic traveling up and down San Mateo Avenue delivering materials to the designated stockpile staging areas. This increase in noise would have a temporary adverse effect on the homes along San Mateo Avenue.

Table 17-14.
Change in Traffic Noise between No-Action Alternative and Alternative A

Road Segments	Speed Limit (mph)	No-Action (2035)		Alternative A (2035)		Change in CNEL (dBA)
		ADT	CNEL (dBA) at 50 feet (feet)	ADT	CNEL (dBA) at 50 feet (feet)	
Bass Avenue east of SR-33	25	632	50	832	51	0
San Mateo Road north of SR-180	25	678	51	2,690	66	15
SR-33 south of SR-180/33 Junction	55	14,632	74	15,098	74	1
SR-33 north of SR-180/33 Junction	55	6,944	72	7,225	73	0
SR-180 west of San Mateo Avenue	55	10,168	71	10,853	72	2
SR-180 east of San Mateo Avenue	55	10,168	71	10,950	73	2

ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel(s)
mph = miles per hour

Table 17-15.
Change in Traffic Noise between Existing Condition and Alternative A

Road Segments	Speed Limit (mph)	Existing (2009)		Alternative A (2009)		Change in CNEL (dBA)
		ADT	CNEL (dBA) at 50 feet (feet)	ADT	CNEL (dBA) at 50 feet (feet)	
Bass Avenue east of SR-33	25	510	50	710	50	1
San Mateo Road north of SR-180	25	547	50	2,559	66	16
SR-33 south of SR-180/33 Junction	55	11,800	73	12,266	73	1
SR-33 north of SR-180/33 Junction	55	5,600	71	5,881	72	1
SR-180 west of San Mateo Avenue	55	8,200	70	8,885	72	2
SR-180 east of San Mateo Avenue	55	8,200	70	8,982	72	2

ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel(s)
mph = miles per hour

When comparing Alternative A to existing conditions, impacts to construction-related traffic noise would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). The noise-sensitive receivers located along San Mateo Avenue would experience a noise increase of up to 16 dBA CNEL from construction-related truck traffic (which is greater than the 5 dBA CNEL significance criteria) and this increased traffic would not necessarily occur during construction exempt times. Therefore, impacts would be **potentially significant**.

Mitigation Measure NOI-3 (Alternative A): *Reduce Temporary Noise Levels from Construction-Related Traffic Increases Near Sensitive Receptors*. Construction-related activities will be modified to reduce temporary and short-term traffic noise at sensitive receptors along San Mateo Avenue when construction-related traffic noise is generated outside of construction noise exempt hours. Implementation of the following measures would reduce potential construction-related traffic noise impacts along San Mateo Avenue to a less-than-significant level. This impact would be **less than significant with mitigation**.

Implementation Action: Project proponents will ensure that the following noise-reduction protocols are implemented on haul routes near sensitive receptors along San Mateo Avenue to reduce temporary and short-term construction-related traffic noise generated outside of construction noise exempt hours.

- Equip all heavy trucks with noise-control devices (e.g., mufflers) in accordance with manufacturers' specifications.
- Inspect all heavy trucks periodically to ensure proper maintenance and presence of noise-control devices (e.g., lubrication, non-leaking mufflers, and shrouding).
- Establish and implement measures to reduce haul truck operation speeds, limit the amount of borrow site material to be hauled daily, and limit the hours of operation for haul trucks.
- Install temporary noise barriers adjacent to sensitive receptor locations, as needed.

Location: Haul routes near sensitive receptors along San Mateo Avenue.

Effectiveness Criteria: Effectiveness will be based on public complaints to the SJRRP.

Responsible Agency: Reclamation and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Ongoing when construction activities occur outside of construction noise exempt hours.

Impact NOI-4 (Alternative A): ***Noise Effects due to Operation and Maintenance Activities.*** Compared to the No-Action Alternative (which would not require additional operation and maintenance activities), operation and maintenance activities associated with Alternative A would not generate a noticeable increase in noise on the surrounding environs. The primary noise source due to operation of the Project would be generated by the increase in traffic caused by the workers going to and from the Project site for operational and maintenance activities. Tables 17-16 and 17-17 illustrate the increases in ADT volumes going into the Project area during both operational and maintenance activities, respectively. The highest possible increase in traffic would occur during maintenance activities at the South Canal control structures and San Mateo Avenue, and would result in an increase of eight trips to the traffic volume. When compared to the traffic along the access routes leading into the Project area, an addition of eight trips would not result in a noticeable change in traffic noise. As a result, there would be a minimal effect on all nearby noise-sensitive receivers.

When comparing Alternative A to existing conditions, impacts to noise would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). The increase in traffic due to operation and maintenance activities would result in a **less than significant** impact.

Table 17-16.
Alternative A Operational Activity ADTs

Operational Activity	Assumptions	ADT
South Canal - river side control structure		
Inspection of gates, seals	periodically throughout flows into the bypass channel	2
Make adjustments	when needed	2
Assessment after flows	when flows to the bypass cease	2
Inspection of ladder	periodically throughout flows into the bypass channel, 1 staff for 1 hour during inspection of gates	2
South Canal - canal side control structure		
Inspection of gates, seals	periodically throughout flows into the bypass channel	2
Make adjustments	when needed	2
Assessment after flows	when flows to the bypass cease	2
San Mateo Avenue		
Road closure	1 worker for 4 hours, 2x per year	2
Fish Screen		
Inspections, flow verification, clear debris	1 Water Tech, 120 days.	2
Velocity measurements	2 DWR Divers, 2x per year, 8 hours per screen, 4 screens	4
Fish Barrier		
Inspection, flow verification, clear debris	1 Water Tech, 120 days.	2
Install/Remove barrier screens	2 Water Techs, one week to install the barrier screens and one week for removal	4

ADT = average daily traffic

Table 17-17.
Alternative A Maintenance Activity ADTs

Maintenance Activity	Assumptions	ADT
South Canal - river side control structure		
Sediment removal from channel	2 workers for one day, 2x per year	4
Lube gates	2 workers for one day, 1x per year	4
Fish Ladder Cleaning	periodically throughout flows into the river, 2 staff	4
Fish attraction pipeline Cleaning	periodically throughout flows into the river, 2 staff	4
South Canal - canal side control structure		
Sediment removal from channel	4 workers for one week, 1x per year	8
Lube gates	2 workers for one day, 1x per year	4
Channel Survey	Survey crew of 4, 2 engineers and 2 techs for one week 1x per year	8
Channel reshaping	4 workers for one week, 1x per year	8
San Mateo Avenue		
Cleaning out culverts	4 workers, 2 days, 1x per year	8
Cleaning of debris off roadway	completed periodically just prior road opening, 2 workers, dozer, truck	4
Fish Screen		
Sediment removal from channel	2 workers for one day, 2x per year	4
Screens removal for cleaning	3 Techs; 4 panels; 2 panels/day; 10 hours/day	6
Screens removal for cleaning	Crane operator; 4 panels; 2 panels/day; 10 hours/day	2
Screens removal for cleaning	Engineer for inspection; 4 panels; 2 panels/day; 1 hour/day	2
Grease and inspect pump/motor	2 Techs (10 hours/month)	4
Brush inspection	2 Techs (10 hours/month)	4
Trash Rack	2 Techs (10 hours/month)	4

ADT = average daily traffic

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Key features of Alternative B include construction of a new levee system to establish a bypass channel northeast of the existing river channel, Compact Bypass Control Structure, Mendota Pool Control Structure, and re-route of Drive 10 ½. No construction activities are proposed at or near Mendota Dam, which falls outside the project boundary under Alternative B. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Impact NOI-1 (Alternative B): ***Exposure of Sensitive Receptors to Temporary Construction Noise.*** Compared to the No-Action Alternative, construction activities associated with Alternative B have the potential to generate a short-term increase in noise on the surrounding environs. The loudest construction activities that would be conducted during Alternative B would be the construction of the Compact Bypass grade control structures, Compact Bypass Bifurcation Structure, fish passage facilities, fish screens, and a fish barrier where the use of pile driving equipment is expected or possible. Appendix 17-C lists the distances to the daytime 50 and nighttime 45 dBA L_{eq} noise

contours for all groups of construction activities that would be conducted for Alternative B. Although the majority of the construction activities are anticipated to be conducted during construction noise exempt hours (weekdays 7:00 a.m. to 7:00 p.m., Saturday 9:00 a.m. to 5:00 p.m.), nighttime construction may occur. Construction activities associated with Alternative B have the potential to generate temporary adverse effects at noise-sensitive receivers as compared to the No-Action Alternative if construction activities are conducted within the daytime 50 dBA L_{eq} or nighttime 45 dBA L_{eq} noise contours during nights and weekends (outside of the construction noise exempt hours).

When comparing Alternative B to existing conditions, impacts to noise would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to the No-Action Alternative). Depending on the construction activity, distances to the daytime 50 dBA L_{eq} noise contours range from 2,200 to 21,700 feet and the nighttime 45 dBA L_{eq} noise contours range from 4,000 to 38,600 feet. Although the majority of the construction activities are anticipated to be conducted during the daytime and during construction noise exempt hours, nighttime construction may occur. Construction activities associated with Alternative B would generate a **potentially significant** impact.

Mitigation Measure NOI-1 (Alternative B): ***Reduce Temporary and Short-Term Noise Levels from Construction-Related Equipment Near Sensitive Receptors.*** Refer to Mitigation Measure NOI-1 (Alternative A). The same measure would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact NOI-2 (Alternative B): ***Exposure of Sensitive Receptors to Temporary Construction Vibration.*** Refer to Impact NOI-2 (Alternative A) for more information. Pile driving activities are anticipated to be conducted more than 300 feet away from each identified sensitive receiver, and there would be a **less than significant** impact.

Impact NOI-3 (Alternative B): ***Increased Off-Site Vehicular Traffic Noise due to Construction Related Trips.*** Compared to the No-Action Alternative, off-site traffic noise levels generated by Project construction worker and truck trips (related to Alternative B) traveling to and from the Project area have the potential to create a noticeable increase in traffic noise. Tables 17-18 and 17-19, shown below, show the change in CNEL (dBA) for the No-Action Alternative and existing conditions compared to Alternative B, respectively. The largest increase in vehicular traffic noise, as compared to the No-Action Alternative, would be along San Mateo Avenue where three noise sensitive receivers (LT-2, R-7 and R-6) would experience a traffic noise increase of up to 15 dBA CNEL. This increase in traffic noise is a result of construction related truck traffic traveling up and down San Mateo Avenue delivering construction related materials to the designated stockpile staging areas. This increase in noise would have a temporary adverse effect on the homes along San Mateo Avenue.

When comparing Alternative B to existing conditions, impacts to noise would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to the No-Action Alternative). The noise sensitive receivers located along San Mateo Avenue would experience a noise increase of up to 16 dBA CNEL from construction related truck

traffic and this increased traffic would not necessarily occur during construction exempt times. Therefore, impacts would be **potentially significant**.

Table 17-18.
Change in Traffic Noise between No-Action Alternative and Alternative B

Road Segments	Speed Limit (mph)	No-Action (2035)		Alternative B (2035)		Change in CNEL (dBA)
		ADT	CNEL (dBA) at 50 feet (feet)	ADT	CNEL (dBA) at 50 feet (feet)	
Bass Avenue east of SR-33	25	632	50	832	51	0
San Mateo Road north of SR-180	25	678	51	2,574	66	15
SR-33 south of SR-180/33 Junction	55	14,632	74	15,068	74	1
SR-33 north of SR-180/33 Junction	55	6,944	72	7,226	73	0
SR-180 west of San Mateo Avenue	55	10,168	71	10,794	72	2
SR-180 east of San Mateo Avenue	55	10,168	71	10,922	73	2

ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel(s)
mph = miles per hour

Table 17-19.
Change in Traffic Noise between Existing (2009) Condition and Alternative B (2009) (CNEL dBA)

Road Segments	Speed Limit (mph)	Existing (2009)		Alternative B (2009)		Change in CNEL (dBA)
		ADT	CNEL (dBA) at 50 feet (feet)	ADT	CNEL (dBA) at 50 feet (feet)	
Bass Avenue east of SR-33	25	510	50	710	50	1
San Mateo Road north of SR-180	25	547	50	2,443	66	16
SR-33 south of SR-180/33 Junction	55	11,800	73	12,236	73	1
SR-33 north of SR-180/33 Junction	55	5,600	71	5,882	72	1
SR-180 west of San Mateo Avenue	55	8,200	70	8,826	72	2
SR-180 east of San Mateo Avenue	55	8,200	70	8,954	72	2

ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel(s)
mph = miles per hour

Mitigation Measure NOI-3 (Alternative B): *Reduce Temporary Noise Levels from Construction-Related Traffic Increases Near Sensitive Receptors*. Refer to Mitigation Measure NOI-3 (Alternative A). The same measure would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact NOI-4 (Alternative B): ***Noise Effects due to Operation and Maintenance Activities.*** Compared to the No-Action Alternative (which would not require additional operation and maintenance activities), operation and maintenance activities associated with Alternative B would not generate a noticeable increase in noise on the surrounding environs. The primary noise source due to operation of the Project would be generated by the increase in traffic caused by the workers going to and from the Project site for operational and maintenance activities. Tables 17-20 and 17-21, shown below, illustrate the increases in ADT volumes going into the Project area during both operational and maintenance activities, respectively. The highest possible increase in traffic would occur during maintenance activities at the Compact Bypass Bifurcation Structure and San Mateo Avenue, which would result in an increase of eight trips to the traffic volume. When compared to the ambient traffic along the access routes leading into the Project area, an addition of eight trips would not result in a noticeable change in traffic noise. As a result, there would be a minimum effect on all nearby noise sensitive receivers.

When comparing Alternative B to existing conditions, impacts to noise would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to the No-Action Alternative). The increase in traffic due to operation and maintenance activities would result in a **less than significant** impact.

Table 17-20.
Alternative B Operational Activity ADTs

Operational Activity	Assumptions	ADT
Compact Bypass Bifurcation - river side control structure		
Inspection of gates, seals	periodically throughout flows into the bypass channel	2
Make adjustments	when needed	2
Assessment after flows	when flows to the bypass cease	2
Inspection of ladder	periodically throughtout flows into the bypass channel, 1 staff for 1 hour during inspection of gates	2
Compact Bypass Bifurcation - canal side control structure		
Inspection of gates, seals	periodically throughout flows into the bypass channel	2
Make adjustments	when needed	2
Assessment after flows	when flows to the bypass cease	2
San Mateo Avenue		
Road closure	1 worker for 4 hours, 2x per year	2
Chowchilla - river side control structure		
Inspection of gates, seals	periodically throughout flows into the bypass channel	2
Make adjustments	when needed	2
Assessment after flows	when flows to the bypass cease	2
Inspection of ladder	periodically throughtout flows into the bypass channel, 1 staff for 1 hour during inspection of gates	2
Fish Screen		
Inspections, flow verification, clear debris	1 Water Tech, 120 days.	2
Velocity measurements	2 DWR Divers, 2x per year, 8 hours per screen at 4 screens	4

Table 17-20.
Alternative B Operational Activity ADTs

Operational Activity	Assumptions	ADT
Fish Barrier		
Inspection, flow verification, clear debris	1 Water Tech, 120 days.	2
Install/Remove barrier screens	2 Water Techs, one week to install the barrier screens and one week for removal	4

ADT = average daily traffic

Table 17-21.
Alternative B Maintenance Activity ADTs

Maintenance Activity	Assumptions	ADT
Compact Bypass Bifurcation - river side control structure		
Sediment removal from channel	2 workers for one day, 2x per year	4
Lube gates	2 workers for one day, 1x per year	4
Fish Ladder Cleaning	periodically throughtout flows into the river, 2 staff	4
Fish attraction pipeline Cleaning	periodically throughtout flows into the river, 2 staff	4
Compact Bypass Bifurcation - canal side control structure		
Sediment removal from channel	4 workers for one week, 1x per year	8
Lube gates	2 workers for one day, 1x per year	4
Channel Survey	Survey crew of 4, 2 engineers and 2 techs for one week 1x per year	8
Channel reshaping	4 workers for one week, 1x per year	8
San Mateo Avenue		
Cleaning out culverts	4 workers, 2 days, 1x per year	8
Cleaning of debris off roadway	completed periodically just prior road opening, 2 workers, dozer, truck	4
Fish Screen		
Sediment removal from channel	2 workers for one day, 2x per year	4
Screens removal for cleaning	3 Techs; 4 panels; 2 panels/day; 10 hours/day	6
Screens removal for cleaning	Crane operator; 4 panels; 2 panels/day; 10 hours/day	2
Screens removal for cleaning	Engineer for inspection ; 4 panels; 2 panels/day; 1 hour/day	2
Grease and inspect pump/motor	2 Techs (10 hours/month)	4
Brush inspection	2 Techs (10 hours/month)	4
Trash Rack	2 Techs (10 hours/month)	4

ADT = average daily traffic

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Key features of Alternative C for noise and vibration include construction of new fish passage facilities at Mendota Dam, grade control structures downstream of Mendota Dam, a new Fresno Slough Dam, and Main Canal and Helm Ditch relocations.

Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Impact NOI-1 (Alternative C): ***Exposure of Sensitive Receptors to Temporary Construction Noise.*** Compared to the No-Action Alternative, construction activities associated with Alternative C have the potential to generate a short-term increase in noise on the surrounding environs. The loudest construction activities that would be conducted during Alternative C would be the construction of the Fresno Slough Dam, Short Canal control structure, fish passage facilities and fish screens, modifications of Mendota Dam including installation of downstream grade control structures where the use of pile driving equipment is expected or possible. Appendix 17-C lists the distances to the daytime 50 and nighttime 45 dBA L_{eq} noise contours for all groups of construction activities that would be conducted for Alternative C. Although the majority of the construction activities are anticipated to be conducted during construction noise exempt hours (weekdays 7:00 a.m. to 7:00 p.m., Saturday 9:00 a.m. to 5:00 p.m.), nighttime construction may occur. Construction activities associated with Alternative C, as compared to the No-Action Alternative, have the potential to generate temporary adverse effects at noise-sensitive receivers if construction activities are conducted within the daytime 50 L_{eq} dBA or nighttime 45 dBA L_{eq} noise contours during nights and weekends (outside of the construction noise exempt hours).

When comparing Alternative C to existing conditions, impacts to noise would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative C to the No-Action Alternative). Depending on the construction activity, distances to the daytime 50 dBA L_{eq} noise contours range from 2,900 to 21,700 feet and the nighttime 45 dBA L_{eq} noise contours range from 5,200 to 38,600 feet. Although the majority of the construction activities are anticipated to be conducted during the daytime and during construction noise exempt hours, nighttime construction may occur. Construction activities associated with Alternative C would generate a **potentially significant** impact.

Mitigation Measure NOI-1 (Alternative C): ***Reduce Temporary and Short-Term Noise Levels from Construction-Related Equipment Near Sensitive Receptors.*** Refer to Mitigation Measure NOI-1 (Alternative A). The same measure would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact NOI-2 (Alternative C): ***Exposure of Sensitive Receptors to Temporary Construction Vibration.*** Compared to the No-Action Alternative, vibration levels generated by Project construction activities related to Alternative C have the potential to temporarily increase ground-borne vibration levels near sensitive receptors. Ground-borne vibration levels generated by pile drivers located less than 300 feet away from sensitive receivers would have an adverse effect on the sensitive receivers. (Refer to Impact NOI-2 (Alternative A) for more information.) One residential structure would be located approximately 260 feet away from pile driving activities under Alternative C and therefore effects generated by ground-borne vibration could be noticeable.

When comparing Alternative C to existing conditions, impacts to noise would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative C to the

No-Action Alternative). Pile driving activities are anticipated to be conducted within 300 feet of an identified sensitive receiver, and therefore impacts would be **potentially significant**.

Mitigation Measure NOI-2 (Alternative C): *Minimize Vibration Related Effects.* Construction activities in the Project area will be modified to minimize adverse effects to the public or the environment, including implementing control measures prior to and during pile driving activities. Implementation of the following measures would reduce potential vibration-related effects to a less-than-significant level. This impact would be **less than significant with mitigation**.

Implementation Action: The contractors will implement the following actions to minimize potential vibration-related effects:

- Notify nearby homeowners of pile driving activities when pile driving would be conducted within 300 feet or less of residential structures.
- Conduct pile driving activities during daytime hours only (between 7:00 a.m. to 7:00 p.m.).
- Utilize drill-and-casing methods or a vibratory pile driver when conducting pile driving activities within 300 feet or less of residential structures.

Location: Project areas where pile driving construction activities will be conducted within 300 feet or less of sensitive receptors.

Effectiveness Criteria: Effectiveness will be based on public complaints to the SJRRP.

Responsible Agency: Reclamation and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Ongoing during pile driving construction activities within 300 feet or less of residential structures.

Impact NOI-3 (Alternative C): *Increased Off-Site Vehicular Traffic Noise due to Construction Related Trips.* Compared to the No-Action Alternative, off-site traffic noise levels generated by Project construction worker and truck trips (related to Alternative C) traveling to and from the Project area have the potential to create a noticeable increase in traffic noise. Tables 17-22 and 17-23, shown below, show the change in CNEL (dBA) for the No-Action Alternative and existing conditions compared to Alternative C, respectively. The largest increase in vehicular traffic noise, compared to the No-Action Alternative, would be along San Mateo Avenue where three noise sensitive receivers (LT-2, R-7 and R-6) would experience a traffic noise increase of up to 14 dBA CNEL. This increase in traffic noise is a result of construction related truck traffic traveling up and down San Mateo Avenue delivering construction related materials

to the designated stockpile staging areas. This increase in noise would have a temporary adverse effect on the homes along San Mateo Avenue.

When comparing Alternative C to existing conditions, impacts to construction-related traffic noise would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative C to the No-Action Alternative). The noise sensitive receivers located along San Mateo Avenue would experience a noise increase of up to 15 dBA CNEL from construction related truck traffic and this increased traffic would not necessarily occur during construction exempt times. Therefore, impacts would be **potentially significant**.

Table 17-22.
Change in Traffic Noise between No-Action Alternative and Alternative C

Road Segments	Speed Limit (mph)	No-Action (2035)		Alternative C (2035)		Change in CNEL (dBA)
		ADT	CNEL (dBA) at 50 feet (feet)	ADT	CNEL (dBA) at 50 feet (feet)	
Bass Avenue east of SR-33	25	632	50	832	51	0
San Mateo Road north of SR-180	25	678	51	2,139	65	14
SR-33 south of SR-180/33 Junction	55	14,632	74	15,012	74	0
SR-33 north of SR-180/33 Junction	55	6,944	72	7,149	73	0
SR-180 west of San Mateo Avenue	55	10,168	71	10,670	72	1
SR-180 east of San Mateo Avenue	55	10,168	71	10,744	72	1

ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel(s)
mph = miles per hour

Table 17-23.
Change in Traffic Noise between Existing Conditions and Alternative C

Road Segments	Speed Limit (mph)	Existing (2009)		Alternative C (2009)		Change in CNEL (dBA)
		ADT	CNEL (dBA) at 50 feet (feet)	ADT	CNEL (dBA) at 50 feet (feet)	
Bass Avenue east of SR-33	25	510	50	710	50	1
San Mateo Road north of SR-180	25	547	50	2,008	65	15
SR-33 south of SR-180/33 Junction	55	11,800	73	12,180	73	1
SR-33 north of SR-180/33 Junction	55	5,600	71	5,805	72	0
SR-180 west of San Mateo Avenue	55	8,200	70	8,702	71	2
SR-180 east of San Mateo Avenue	55	8,200	70	8,776	71	2

ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel(s)
mph = miles per hour

Mitigation Measure NOI-3 (Alternative C): ***Reduce Temporary Noise Levels from Construction-Related Traffic Increases Near Sensitive Receptors.*** Refer to Mitigation Measure NOI-3 (Alternative A). The same measure would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact NOI-4 (Alternative C): ***Noise Effects due to Operation and Maintenance Activities.*** Compared to the No-Action Alternative (which would not require additional operation and maintenance activities), operation and maintenance activities associated with Alternative C would not generate a noticeable increase in noise on the surrounding environs. The primary noise source due to operation of the Project would be generated by the increase in traffic caused by the workers going to and from the Project site for operational and maintenance activities. Tables 17-24 and 17-25, shown below, illustrate the increases in ADT volumes going into the Project area during both operational and maintenance activities, respectively. The highest possible increase in traffic would occur during maintenance activities at the Short Canal Control Structure and San Mateo Avenue, which would result in an increase of eight trips to the traffic volume. When compared to the ambient traffic along the access routes leading into the Project area, an addition of eight trips would not result in a noticeable change in traffic noise. As a result, there would be a minimum effect on all nearby noise sensitive receivers.

Table 17-24.
Alternative C Operational Activity ADTs

Operational Activity	Assumptions	ADT
Fresno Slough Dam Estimate		
Inspection of gates, seals	periodically throughout flows into the bypass channel	2
Make adjustments	when needed	2
Monitor for seepage	when flows to the bypass cease	2
Short Canal - canal side control structure		
Inspection of gates, seals	periodically throughout flows into the bypass channel	2
Make adjustments	when needed	2
Assessment after flows	when flows to the bypass cease	2
Mendota Dam		
Installation/Removal of Flashboards	installation during flows into the bypass channel and removal when flows are no longer needed, 4 water techs for 2 days every 4 years	2
Make adjustments	when needed	2
Assessment after flows	when flows to the bypass cease	2
Inspection of ladder	periodically throughtout flows into the bypass channel, 1 staff for 1 hour during inspection of gates	2
San Mateo Avenue		
Road closure	1 worker for 4 hours, 2x per year	2
Chowchilla Bifurcation - river side control structure		
Inspection of gates, seals	periodically throughout flows into the bypass channel	2
Make adjustments	when needed	2
Assessment after flows	when flows to the bypass cease	2
Inspection of ladder	periodically throughtout flows into the bypass channel, 1 staff for 1 hour during inspection of gates	2

Table 17-24.
Alternative C Operational Activity ADTs

Operational Activity	Assumptions	ADT
Fish Screen		
Inspections, flow verification, clear debris	1 Water Tech, 120 days.	2
Velocity measurements	2 DWR Divers, 2x per year, 8 hours per screen, 4 screens	4
Fish Barrier		
Inspection, flow verification, clear debris	1 Water Tech, 120 days.	2
Install/Remove barrier screens	2 Water Techs, one week to install the barrier screens and one week for removal	4

ADT = average daily traffic

Table 17-25.
Alternative C Maintenance Activity ADTs

Maintenance Activity	Assumptions	ADT
Fresno Slough Dam Estimate		
Sediment removal from channel	2 workers for one day, 2x per year	4
Lube gates	2 workers for one day, 1x per year	4
Short Canal - canal side control structure		
Sediment removal from channel	4 workers for one week, 1x per year	8
Lube gates	2 workers for one day, 1x per year	4
San Mateo Avenue		
Cleaning out culverts	4 workers, 2 days, 1x per year	8
Cleaning of debris off roadway	completed periodically just prior road opening, 2 workers, dozer, truck	4
Chowchilla Bifurcation Structure Estimate		
Sediment removal from channel	2 workers for one day, 2x per year	8
Lube gates	2 workers for one day, 1x per year	8
Mendota Dam		
Fish Ladder Cleaning	periodically throughout flows into the bypass channel, 2 staff	4
Sediment removal from channel	2 workers for one day, 2x per year every 4 years	4
Fish Screen		
Sediment removal from channel	2 workers for one day, 2x per year	4
Screens removal for cleaning	3 Techs; 4 panels; 2 panels/day; 10 hours/day	6
Screens removal for cleaning	Crane operator; 4 panels; 2 panels/day; 10 hours/day	2
Screens removal for cleaning	Engineer for inspection ; 4 panels; 2 panels/day; 1 hour/day	2
Grease and inspect pump/motor	2 Techs (10 hours/month)	4
Brush inspection	2 Techs (10 hours/month)	4
Trash Rack	2 Techs (10 hours/month)	4

ADT = average daily traffic

When comparing Alternative C to existing conditions, impacts to noise would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative C to the No-Action Alternative). The increase in traffic due to operation and maintenance activities would result in a **less than significant** impact.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Key features of Alternative D for noise and vibration include construction of new fish passage facilities at Mendota Dam, grade control structures downstream of Mendota Dam, Fresno Slough Dam, Main Canal and Helm Ditch relocations, and the North Canal. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Impact NOI-1 (Alternative D): ***Exposure of Sensitive Receptors to Temporary Construction Noise.*** Compared to the No-Action Alternative, construction activities associated with Alternative D have the potential to generate a short-term increase in noise on the surrounding environs. The loudest construction activities that would be conducted during Alternative D would be the construction of Fresno Slough Dam, North Canal bifurcation structure, fish passage facilities, fish screens, and a fish barrier where the use of pile driving equipment is expected or possible. Appendix 17-C lists the distances to the daytime 50 and nighttime 45 dBA L_{eq} noise contours for all groups of construction activities that would be conducted for Alternative D. Although the majority of the construction activities are anticipated to be conducted during construction noise exempt hours (weekdays 7:00 a.m. to 7:00 p.m., Saturday 9:00 a.m. to 5:00 p.m.), nighttime construction may occur. Construction activities associated with Alternative D, in comparison to the No-Action Alternative, have the potential to generate temporary adverse effects at noise-sensitive receivers if construction activities are conducted within the daytime 50 dBA L_{eq} or nighttime 45 dBA L_{eq} noise contours during nights and weekends (outside of the construction noise exempt hours).

When comparing Alternative D to existing conditions, impacts to noise would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative D to the No-Action Alternative). Depending on the construction activity, distances to the daytime 50 dBA L_{eq} noise contours range from 2,200 to 21,700 feet and the nighttime 45 dBA L_{eq} noise contours range from 4,000 to 38,600 feet. Although the majority of the construction activities are anticipated to be conducted during the daytime and during construction noise exempt hours, nighttime construction may occur. Construction activities associated with Alternative D would generate a **potentially significant** impact.

Mitigation Measure NOI-1 (Alternative D): ***Reduce Temporary and Short-Term Noise Levels from Construction-Related Equipment Near Sensitive Receptors.*** Refer to Mitigation Measure NOI-1 (Alternative A). The same measure would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact NOI-2 (Alternative D): ***Exposure of Sensitive Receptors to Temporary Construction Vibration.*** Refer to Impact NOI-2 (Alternative C) for more information. Pile driving activities are anticipated to be conducted within 300 feet away from an identified sensitive receiver, and therefore impacts would be **potentially significant**.

Mitigation Measure NOI-2 (Alternative C): ***Minimize Vibration Related Effects.*** Refer to Mitigation Measure NOI-2 (Alternative C). The same measure would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact NOI-3 (Alternative D): ***Increased Off-Site Vehicular Traffic Noise due to Construction Related Trips.*** Compared to the No-Action Alternative, off-site traffic noise levels generated by Project construction worker and truck trips (related to Alternative D) traveling to and from the Project area have the potential to create a noticeable increase in traffic noise. Tables 17-26 and 17-27, shown below, show the change in CNEL (dBA) for the No-Action Alternative and existing conditions compared to Alternative D, respectively. The largest increase in vehicular traffic noise, as compared to the No-Action Alternative, would be along San Mateo Avenue where three noise sensitive receivers (LT-2, R-7 and R-6) would experience a traffic noise increase of up to 14 dBA CNEL. This increase in traffic noise is a result of construction related truck traffic traveling up and down San Mateo Avenue delivering construction related materials to the designated stockpile staging areas. This increase in noise would have a temporary adverse effect on the homes along San Mateo Avenue.

Table 17-26.
Change in Traffic Noise between No-Action Alternative and Alternative D

Road Segments	Speed Limit (mph)	No-Action (2035)		Alternative D (2035)		Change in CNEL (dBA)
		ADT	CNEL (dBA) at 50 feet (feet)	ADT	CNEL (dBA) at 50 feet (feet)	
Bass Avenue east of SR-33	25	632	50	832	51	0
San Mateo Road north of SR-180	25	678	51	2,137	65	14
SR-33 south of SR-180/33 Junction	55	14,632	74	15,011	74	0
SR-33 north of SR-180/33 Junction	55	6,944	72	7,152	73	0
SR-180 west of San Mateo Avenue	55	10,168	71	10,661	72	1
SR-180 east of San Mateo Avenue	55	10,168	71	10,749	72	1

ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel(s)
mph = miles per hour

Table 17-27.
Change in Traffic Noise between Existing Conditions and Alternative D

Road Segments	Speed Limit (mph)	Existing (2009)		Alternative D (2009)		Change in CNEL (dBA)
		ADT	CNEL (dBA) at 50 feet (feet)	ADT	CNEL (dBA) at 50 feet (feet)	
Bass Avenue east of SR-33	25	510	50	710	50	1
San Mateo Road north of SR-180	25	547	50	2,006	65	15
SR-33 south of SR-180/33 Junction	55	11,800	73	12,179	73	1
SR-33 north of SR-180/33 Junction	55	5,600	71	5,808	72	0
SR-180 west of San Mateo Avenue	55	8,200	70	8,693	71	1
SR-180 east of San Mateo Avenue	55	8,200	70	8,781	72	2

ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel(s)
mph = miles per hour

When comparing Alternative D to existing conditions, impacts to construction-related traffic noise would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative D to the No-Action Alternative). The noise sensitive receivers located along San Mateo Avenue would experience a noise increase of up to 15 dBA CNEL from construction related truck traffic and this increased traffic would not necessarily occur during construction exempt times. Therefore, impacts would be **potentially significant**.

Mitigation Measure NOI-3 (Alternative D): ***Reduce Temporary Noise Levels from Construction-Related Traffic Increases Near Sensitive Receptors.*** Refer to Mitigation Measure NOI-3 (Alternative A). The same measure would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact NOI-4 (Alternative D): ***Noise Effects due to Operation and Maintenance Activities.*** Compared to the No-Action Alternative (which would not require additional operation and maintenance activities), operation and maintenance activities associated with Alternative D would not generate a noticeable increase in noise on the surrounding environs. The primary noise source due to operation of the Project would be generated by the increase in traffic caused by the workers going to and from the Project site for operational and maintenance activities. Tables 17-28 and 17-29, shown below, illustrate the increases in ADT volumes going into the Project area during both operational and maintenance activities, respectively. The highest possible increase in traffic would occur during maintenance activities at the North Canal control structures and San Mateo Avenue, which would result in an increase of eight trips to the traffic volume. When compared to the ambient traffic along the access routes leading into the Project area, an addition of eight trips would not result in a noticeable change in traffic noise. As a result, there would be a minimum effect on all nearby noise sensitive receivers.

When comparing Alternative D to existing conditions, impacts to noise would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative D to the No-Action Alternative). The increase in traffic due to operation and maintenance activities would result in a **less than significant** impact.

Table 17-28.
Alternative D Operational Activity ADTs

Operational Activity	Assumptions	ADT
Fresno Slough Dam Estimate		
Inspection of gates, seals	periodically throughout flows into the bypass channel	2
Make adjustments	when needed	2
Monitor for seepage	when flows to the bypass cease	2
Mendota Dam		
Inspection of ladder	periodically throughtout flows into the bypass channel, 1 staff for 1 hour during inspection of gates	2
North Canal - river side control structure		
Inspection of gates, seals	periodically throughout flows into the bypass channel	2
Make adjustments	when needed	2
Assessment after flows	when flows to the bypass cease	2
Inspection of ladder	periodically throughtout flows into the bypass channel, 1 staff for 1 hour during inspection of gates	2
North Canal - canal side control structure		
Inspection of gates, seals	periodically throughout flows into the bypass channel	2
Make adjustments	when needed	2
Assessment after flows	when flows to the bypass cease	2
Fish Screen		
Inspections, flow verification, clear debris	1 Water Tech, 120 days.	2
Velocity measurements	2 DWR Divers, 2x per year, 8 hours per screen, 4 screens	4
Fish Barrier		
Inspection, flow verification, clear debris	1 Water Tech, 120 days.	2
Install/Remove barrier screens	2 Water Techs, one week to install the barrier screens and one week for removal	4

ADT = average daily traffic

Table 17-29.
Alternative D Maintenance Activity ADTs

Maintenance Activity	Assumptions	ADT
Fresno Slough Dam Estimate		
Sediment removal from channel	2 workers for one day, 2x per year	4
Lube gates	2 workers for one day, 1x per year	4
North Canal - river side control structure		
Sediment removal from channel	2 workers for one day, 2x per year	4
Lube gates	2 workers for one day, 1x per year	4

Table 17-29.
Alternative D Maintenance Activity ADTs

Maintenance Activity	Assumptions	ADT
Fish Ladder Cleaning	periodically throughtout flows into the river, 2 staff	4
Fish attraction pipeline Cleaning	periodically throughtout flows into the river, 2 staff	4
North Canal - canal side control structure		
Sediment removal from channel	4 workers for one week, 1x per year	8
Lube gates	2 workers for one day, 1x per year	4
Channel Survey	Survey crew of 4, 2 engineers and 2 techs for one week 1x per year	8
Channel reshaping	4 workers for one week, 1x per year	8
Mendota Dam		
Fish Ladder Cleaning	periodically throughtout flows into the bypass channel, 2 staff	4
Sediment removal from channel	2 workers for one day, 2x per year every 4 years	4
Fish Screen		
Sediment removal from channel	2 workers for one day, 2x per year	4
Screens removal for cleaning	3 Techs; 4 panels; 2 panels/day; 10 hours/day	6
Screens removal for cleaning	Crane operator; 4 panels; 2 panels/day; 10 hours/day	2
Screens removal for cleaning	Engineer for inspection ; 4 panels; 2 panels/day; 1 hour/day	2
Grease and inspect pump/motor	2 Techs (10 hours/month)	4
Brush inspection	2 Techs (10 hours/month)	4
Trash Rack	2 Techs (10 hours/month)	4

ADT = average daily traffic

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18.0 Paleontological Resources

Paleontological resources (fossils) are the remains or traces of prehistoric animals and plants. This chapter describes environmental and regulatory settings for scientifically important fossil remains, as well as environmental consequences and mitigation measures, as they pertain to implementation of the Project alternatives in the Project area.

18.1 Environmental Setting

18.1.1 Physiographic Environment

The Project area is located in the San Joaquin Valley. The San Joaquin Valley and the Sacramento Valley comprise the Great Valley, commonly referred to as the Central Valley of California. The Great Valley geomorphic province is located between the Sierra Nevada geomorphic province on the east and the Coast Range geomorphic province on the west, as described in Chapter 10.0, "Geology and Soils."

The Great Valley is composed of thousands of feet of sedimentary deposits that have undergone periods of subsidence and uplift over millions of years. During the Jurassic (approximately 206 million years Before Present [B.P.]) and Cretaceous (approximately 144 million years B.P.) periods of the Mesozoic era, the Great Valley existed in the form of an ancient ocean. By the end of the Mesozoic era, the northern portion of the Great Valley began to fill with sediment as tectonic forces caused uplift of the basin. Geologic evidence suggests that the Sacramento Valley and San Joaquin Valley gradually separated into two separate water bodies as uplift and sedimentation continued. By the time of the Miocene epoch (approximately 24 million years B.P.), sediments deposited in the Sacramento Valley were mostly of terrestrial origin. In contrast, the San Joaquin Valley continued to be inundated with water for another 20 million years, as indicated by marine sediments dated to the late Pliocene epoch (approximately 5 million years B.P.). Most of the surface of the Great Valley is covered with Holocene (i.e., less than 11,000 years B.P.) and Pleistocene (11,000 to 1.5 million years B.P.) alluvium. This alluvium is composed of sediments originating from the Sierra Nevada to the east and the Coast Ranges to the west that were carried by water and deposited on the valley floor. Siltstone, claystone, and sandstone are the primary types of sedimentary deposits.

18.1.2 Geologic Setting

Geologic history and conditions are relevant to the evaluation of paleontological resources because they influence the type of fossils that may be found (i.e., aquatic vs. terrestrial organisms) and the probability that any prehistoric remains would be subject to fossilization rather than normal decay. The depositional history of the San Joaquin Valley during the late Quaternary included several cycles related to fluctuations in regional and global climate that caused alternating periods of deposition followed by periods of subsidence and erosion. Thus, the San Joaquin Valley during the Pleistocene consisted of

stages of wetlands and floodplain creation as tidewaters rose in the valley from the west, areas of erosion when tidewaters receded, and alluvial fan deposition from streams emanating from the adjacent mountain ranges (Bartow 1991).

Regional and local surficial geologic mapping and correlation of the various geologic units in the Project area and vicinity have been provided by Jennings and Strand (1958). Geologic mapping by Jennings and Strand (1958) indicates that the Project components and a surrounding 1-mile buffer zone are located in the following geological rock units:

- **Qsc – Recent River and Major Stream Channel Deposits in the Great Valley (Holocene).** This unit is comprised of sediments along the river channels and major streams including adjacent natural levees.
- **Qf – Recent Alluvial Fan Deposits in the Great Valley (Holocene).** This unit is comprised of granitic sand and silt sediments deposited from streams emerging from highlands surrounding the Great Valley.
- **Qb – Recent Basin Deposits in the Great Valley (Holocene).** This unit is comprised of sediments deposited during flood stages of major streams between natural stream levees and fans.

In addition to these three geological units, the following three geological units likely occur underneath portions of Project area and may be encountered during ground disturbance activities greater than a few feet.

- **Qf – Modesto Formation (Pleistocene).** This unit is comprised of granitic sand and silt river terrace or coalescing alluvial fan deposits emerging from surrounding highlands.
- **Qc – Riverbank Formation (Pleistocene).** This unit is comprised of granitic sand, silt and clay older alluvium and dissected fan deposits.
- **Qp – Turlock Lake Formation (Pliocene-Pleistocene).** This unit is comprised of granitic sand, silt, clay and cobbles alluvium deposits.

18.1.3 Local Paleontological Resources

The following is an inventory and assessment of paleontological resources by rock unit (see Table 18-1). In general, to be considered a fossil, a specimen must be older than recent (approximately 10,000 years old). Because sediments of the Recent River and Major Stream Channel Deposits in the Great Valley (Qsc), the Recent Alluvial Fan Deposits in the Great Valley (Qf), and the Recent Alluvial Fan Deposits in the Great Valley (Qb) are considered Holocene (recent) in age, these sediments are unlikely to contain significant paleontological resources and are considered to have low paleontological sensitivity. These three Holocene (recent) geological units are likely underlain by older Pleistocene age units including the Modesto (Qf) Formation, Riverbank (Qc) Formation, and the Pliocene- Pleistocene Turlock Lake (Qp) Formation. These Pliocene-Pleistocene sediments in the Great Valley are reported to contain significant vertebrate fossils (Stirton 1951, Savage 1951, Jefferson 1991a, Jefferson 1991b and Dundas et al. 1996) and are considered to have high paleontological sensitivity.

Table 18-1.
Rock Unit Description in Reach 2B, San Joaquin Valley, CA

Unit within 1-Mile Buffer Zone of Project Area	Name/Description of Unit	Age	Paleontological Sensitivity
Qsc	Stream Channel Deposits	Holocene	Low
Qf	Fan Deposits	Holocene	Low
Qb	Basin Deposits	Holocene	Low
Qf	Modesto Formation	Pleistocene	High
Qc	Riverbank Formation	Pleistocene	High
Qp	Turlock Lake Formation	Pliocene-Pleistocene	High

A University of California Museum of Paleontology (UCMP) on-line catalogue database search of the Restoration Area, completed in 2009 as part of the Program Environmental Impact Statement/Report (PEIS/R) (San Joaquin River Restoration Program [SJRRP] 2011, page 18-4), located two known fossil localities (V4401 and V6806). In addition, this investigation searched the UCMP on-line catalogue database for Pleistocene vertebrate localities in Fresno and Madera Counties (UCMP 2013) which resulted in four additional locations (V5206, V65100, V81121 and V93128). The paleontological sensitivity of all six areas is high. Details of the localities are provided below and in Table 18-2:

- **V4401:** This locality is in the Modesto Formation and located in the Tranquility area in Fresno County. The area is Pleistocene in age. There are 149 fossil records containing mammals (moles, gophers, mice, wood rats, voles, jack rabbits, coyote, red fox, grey fox, badger, horse, camel, pronghorn antelope, elk, deer, and bison), birds, reptiles (turtles and snakes), and bony fish.
- **V5206**: This locality is located Madera County but the name of the specific Formation was not included in the UCMP database. The area is Pleistocene in age. There is one fossil record containing a mammal (horse).
- **V6806:** This locality is in the Modesto Formation and located in the Merced River 1 area in Merced County. The area is Pleistocene in age. There are four fossil records containing mammals (horse, bison, sloth, and camel).
- **V65100:** This locality is located in the Riverdale area in Fresno County but the name of the specific Formation was included in the UCMP database. The area is Pleistocene in age. There is one fossil record containing a mammal (camel).
- **V81121:** This locality is in the Riverbank Formation and located in the Laguna Seca Ranch area in Fresno County. The area is Pleistocene in age. There is one fossil record containing a mammal (horse).
- **V93128:** is in the Turlock Lake Formation[1] and is located near Fairmead Landfill in Madera County. There are 213 fossil records containing mammals (mammoth,

[1] The UCMP on-line catalogue database lists this locality in the Riverbank Formation but detailed studies by Dundas et al. (1996) place the fossil bearing strata in the Turlock Lake Formation.

ground sloth, giant short-faced bear, saber tooth cat, wolf, deer, camel, horse, antelope, rodents, birds, reptiles, and fish).

Table 18-2.
UCMP Locality Results for the Project Vicinity (Fresno County, Madera County, and the Restoration Area)

Locality Identification Number	Locality Name	Age	Number of Specimens	Paleontological Sensitivity
V4401	Tranquility	Pleistocene	149	High
V5206	Ehrreich	Pleistocene	1	High
V6806	Merced River 1	Pleistocene	4	High
V65100	Riverdale	Pleistocene	1	High
V81121	Laguna Seca Ranch	Pleistocene	1	High
V93128	Fairmead Landfill	Pleistocene	213	High

UCMP = University of California Museum of Paleontology

18.2 Regulatory Setting

Paleontological resources are included among nonrenewable scientific resources by governmental agencies. Protection of such resources is provided by Federal and State legislation and by some local ordinances as described below.

18.2.1 Federal

The National Environmental Policy Act (NEPA) requires that objects of historic or scientific interest be considered in assessing the environmental consequences of any proposed project. Paleontological resources are afforded Federal protection under 40 Code of Federal Regulations 1508.27 as a subset of scientific resources.

Federal regulations protect paleontological resources on Federal or public land. These regulations are listed below:

- **Antiquities Act of 1906 (16 United States Code [USC] 431–433).** This Act authorizes the Federal government to regulate the disturbance of objects of antiquity on Federal lands through the responsible managing agency and to prosecute unauthorized damage or removal.
- **The Federal Land Policy and Management Act of 1976 (Public Law [PL] 94-579; 90 Stat. 2743, USC 1701-1782).** This Act requires that public lands be managed in a manner that protects the quality of their scientific values.
- **The Paleontological Resources Preservation Act (Omnibus Public Land Management Act of 2009, PL 111-011).** This Act regulates who may collect fossils on Federal lands and where such fossils must be curated.

18.2.2 State of California

The primary State environmental law that protects fossils is the California Environmental Quality Act (CEQA; Pub. Resources Code, § 21000 et seq. CEQA requires that public agencies and private interests identify the significance of the impacts of their proposed projects on any object or site of significance to the scientific annals of California (Pub. Resources Code, § 15064.5, subd. (a)(3)), and this requirement applies to paleontological resources. Appendix G of the State CEQA Guidelines contains an Environmental Checklist of questions that a lead agency should normally address if relevant to a project's environmental impacts. One of the questions to be answered in this Environmental Checklist (Cal. Code Regs., § 15063; Appendix G, Section V, Part c) is the following: "Would the project directly or indirectly destroy a unique paleontological resource or site…?"

Other State requirements for the management of paleontological resources are contained in Public Resources Code Chapter 1.7, section 5097.5 (Statutes 1965, Chapter 1136, Page 2792) under the heading of "Archaeological, Paleontological, and Historical Sites." This statute defines any unauthorized disturbance or removal of a fossil site or remains on public land as a misdemeanor and specifies that State agencies may undertake surveys, excavations, or other operations as necessary on publicly owned lands to preserve or record paleontological resources. Public Resources Code section 30244 requires reasonable mitigation of adverse impacts to paleontological resources on State-owned land.

18.2.3 Regional and Local

The Fresno County General Plan (Fresno County 2000) calls for the identification and protection of paleontological resources. These goals and policies are listed below:

- Goal OS-J is "to identify, protect, and enhance Fresno County's important … paleontological … sites and their contributing environment."
- Policy OS-J.1 states that "The County shall require that discretionary development projects, as part of any required CEQA review, identify and protect important … paleontological … sites and their contributing environment from damage, destruction, and abuse to the maximum extent feasible."

The Madera County General Plan (Madera County 1995) calls for preservation incentive programs for owners of important cultural and paleontological resources. These goals and policies are listed below:

- Goal 4.D is "to identify, protect, and enhance Madera County's important … paleontological … sites and their contributing environment."
- Policy 4.D.2 states that "The County shall coordinate with the cities and advisory councils in the county to promote the preservation and maintenance of Madera County's paleontological … resources."
- Policy 4.D.3 states that "The County shall require that discretionary development projects identify and protect from damage, destruction, and abuse, important … paleontological … sites and their contributing environment."

18.3 Environmental Consequences and Mitigation Measures

18.3.1 Impact Assessment Methodology

The Society of Vertebrate Paleontology (SVP) has developed guidelines and professional standards for assessing the impact of projects on paleontological resources and for mitigation of adverse impacts (SVP 1995, SVP 2010).

Paleontological Resource Assessment Criteria

The SVP (1995) Conformable Impact Mitigation Guidelines outline criteria to assess paleontological sensitivity based on the potential of a geologic unit to contain significant paleontological resources. Based on the SVP Guidelines, a vertebrate fossil is considered significant unless otherwise demonstrated, due to the relative rarity of vertebrate fossils. Vertebrate fossils are so uncommon that, in many cases, each recovered specimen will provide additional important information about the morphological variation or the geographic distribution of its species. Additionally, certain invertebrate or botanical fossils are considered significant paleontological resources if they provide new and substantial taxonomic, phylogenetic, ecologic, or stratigraphic data.

An individual fossil specimen may be considered scientifically important if it contains one or more of the following characteristics:

- It is well preserved.
- Can be identified.
- More complete than most specimens for that species.
- Preserves one or more elements not known in most specimens of that species.
- Indicative of a particular time period.
- Has not been recorded from that sedimentary unit.
- Provides information concerning the environment in which it lived.
- Could be the basis for description of a new species or comes from a site that produced the type (definitive) specimen of its species.
- Belongs to a species rarely encountered.

A rock unit is considered "sensitive" to adverse impacts if there is a high probability that grading, excavation, or other earth-moving would jeopardize significant fossil remains. The paleontological importance or sensitivity of each rock unit exposed is the measure most amenable to assessing the significance of paleontological resources because the areal distribution of each rock unit can be delineated on a topographic or geologic map. The paleontological sensitivity of a stratigraphic unit reflects its potential paleontological productivity and sensitivity as well as the scientific significance of the fossils it has produced. This method of paleontological resource assessment is the most appropriate because discrete levels of paleontological importance can be delineated on a topographic or geologic map.

The SVP Guidelines establish three categories of sensitivity for paleontological resources under the standard guidelines for assessment of paleontological resources. The three categories are low, high, and undetermined, as described below.

- Rock units that are not sedimentary in origin (e.g., most igneous and metamorphic rocks) are categorized as low sensitivity paleontological resources. However, sedimentary rock units may also be categorized as low sensitivity if they have been well examined and have not produced paleontological resources. (Monitoring is not usually recommended or needed during excavation in a rock unit with low sensitivity.)
- High sensitivity paleontological resources are categorized as rock units older than Holocene (recent)[2] for which vertebrate or significant invertebrate or suite of plant fossils have been recovered. (In areas of high paleontological sensitivity, full-time monitoring is recommended during ground disturbance activities.)
- Paleontological resources in sedimentary rock units for which little information is available are categorized as undetermined paleontological sensitivity. It is often possible for an experienced paleontologist to determine whether such a rock unit should be assigned a high or low sensitivity after a pedestrian survey is performed and detailed observations of both natural and artificial exposures of the rock unit are made.

Identification of Local Paleontological Resources

A literature review was performed to aid in the evaluation of the paleontological sensitivity of each geologic unit that would be encountered during Project activities. The paleontological literature was reviewed to assess the locations of published fossil localities at the Project area and within a 1-mile buffer zone, and in the geologic units that would be encountered by Project activities. The paleontological literature was also used to assess the types of fossils that might be encountered as well as the scientific importance of the fossils. The review was conducted by a database search at the UCMP on-line catalogue to locate known fossil localities at the Project area and a 1-mile buffer zone. The geological units, the potential for paleontological resources in these geological units, and known fossil in the Project area and vicinity are discussed in Section 18.1.3.

A key aspect used to assess the Project's potential impacts to paleontological resources is the consideration of locations and depths of Project-related ground disturbance in context of the paleontological sensitivity of the affected soils. Paleontological resources can be affected by earth-moving activities; therefore, the impact analysis discusses only those areas where earth-moving activities may occur. Surface sediments in the Project area are unlikely to contain fossils because of the relatively recent formation of the geological units (i.e., sediments deposited less than 10,000 years ago). Therefore, paleontological resources are unlikely to be affected by streambed erosion or by shallow excavations. However, these surface sediments are underlain by older Pleistocene age formations that may contain vertebrate fossils (see Section 18.1.3). Subsurface soil penetrations (e.g., to construct a foundation for a water control structure) potentially could encounter

[2] Holocene or recent age sediments (less than 10,000 years old) are generally considered to be too young to preserve significant fossils.

paleontological resources. Based on the 5 percent design level, subsurface pilings and excavations would extend up to 35 feet in depth.

18.3.2 Significance Criteria

Because most fossils are of now extinct organisms, they are nonrenewable resources. Therefore, fossils are valuable scientific and educational resources that are protected by Federal, State, and local laws and regulations. The primary State environmental law protecting fossils is CEQA, which requires that public agencies and private interests identify the environmental consequences of their proposed projects on any object or site of significance to the scientific annals of California. The thresholds of significance for potential paleontological impacts were based on the Environmental Checklist Form in Appendix G of the State CEQA Guidelines, as amended. Under NEPA Council on Environmental Quality Regulations, effects must be evaluated in terms of their context and intensity. These factors were considered when applying the CEQA Guidelines Appendix G. The Environmental Checklist Form (Cal. Code Regs., tit. 14 § 15063; Appendix G, Section V, c) includes the following: "Would the project directly or indirectly destroy a unique paleontological resource or site…?"

Although neither CEQA nor the State CEQA Guidelines define what is "a unique paleontological resource or site." CEQA section 21083.2, subdivision (g) defines a "unique archaeological resource" as "…an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
- Has a special and particular quality such as being the oldest of its type or the best available example of its type.
- Is directly associated with a scientifically recognized important prehistoric or historic event or person."

18.3.3 Impacts and Mitigation Measures

This section provides a project-level evaluation of direct and indirect effects of the Project alternatives on paleontological resources. It includes analyses of potential effects relative to No-Action conditions in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. The analysis is organized by Project alternative. With respect to paleontological resources, the environmental impact issue and concern is:

1. Possible Damage to or Destruction of Unique Paleontological Resources.

Other paleontological-related issues covered in the PEIS/R are not covered here because they are programmatic in nature and/or are not relevant to the Project area.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the SJRRP would be implemented, including habitat restoration in other reaches, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these activities would not achieve the Settlement goals. The potential effects of the No-Action Alternative are described below. The analysis is a comparison to existing conditions, and no mitigation is required for No-Action.

Impact PAL-1 (No-Action Alternative): *Possible Damage to or Destruction of Unique Paleontological Resources.* Under the No-Action Alternative, there would be no Project-related construction or ground disturbing activities within the Project area. Therefore, there would be **no impact** on paleontological resources from the Project.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would include construction of Project facilities including a Compact Bypass channel, a new levee system encompassing the existing river channel in a narrow floodplain, and the South Canal. Other key features include construction of the Mendota Pool Dike (separating the San Joaquin River and Mendota Pool), a fish barrier below Mendota Dam, and the South Canal bifurcation structure, fish passage facility, and fish screens, modification of the San Mateo Avenue crossing, and the removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Borrow material would primarily be required for the construction of the levees, but it may also be utilized in the construction of other structures for foundation or backfill material. Levees may be constructed entirely of local borrow material, a mix of local and imported borrow material, or just imported borrow material. Borrow locations would be determined after a geotechnical exploration of potential local borrow areas is complete. It is estimated that up to 350 acres of land would be needed for borrow areas. Some of the soils excavated to construct the Compact Bypass and the South Canal might be used for levee construction, and if this is possible, then the size of the borrow areas may be reduced.

Impact PAL-1 (Alternative A): *Possible Damage to or Destruction of Unique Paleontological Resources.* Compared to the No-Action Alternative, Alternative A includes construction and ground-disturbing activities in areas that are underlain by Holocene-age (less than 11,000 years old) alluvium. Construction activities that occur in Holocene alluvium including Recent River and Major Stream Channel Deposits; Recent Alluvial Fan Deposits; and Recent Basin Deposits would not affect paleontological resources.

However, below the Holocene-age alluvium, the Project area is underlain by Pleistocene-age sediments of the Modesto and Riverbank Formations and the Pliocene-Pleistocene-age sediments of the Turlock Lake Formation, which are considered paleontologically sensitive rock units under SVP Guidelines (SVP 1995). Numerous vertebrate fossil

specimens have been recovered or recorded from the Modesto, Riverbank and Turlock Lake Formations throughout the San Joaquin Valley and near the Restoration Area. Consequently, potential exists for uncovering additional, similar fossil remains during construction-related earthmoving activities in the Project area.

When comparing Alternative A to existing conditions, impacts to paleontological resources would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Implementation of Alternative A may uncover Pleistocene-age fossil remains during construction-related earthmoving activities in the Project area. This impact is considered **potentially significant**.

Mitigation Measure PAL-1 (Alternative A): *Stop Work if Paleontological Resources Are Encountered During Earthmoving Activities and Implement Recovery Plan.* To minimize potential adverse impacts on unique, scientifically important paleontological resources during earthmoving activities, the following measures would be implemented during construction to reduce possible damage to unique paleontological resources. The contractor will conduct employee training for the construction workers at the site on identification of paleontological resources. If paleontological resources are discovered in local borrow areas, during earthmoving activities, or in the river channel, the construction crew will immediately cease work in the vicinity of the find. A paleontologist approved by Reclamation and/or CSLC staff will evaluate the resource and prepare a recovery plan in accordance with SVP Guidelines (SVP 1995). The recovery plan may include a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings. Recommendations in the recovery plan will be implemented before construction activities could resume at the site where the paleontological resources were discovered.

Implementing this mitigation measure would reduce potentially significant impacts related to potential damage to unique paleontological resources to a less-than-significant level because if resources were encountered, fossil specimens would be recovered, recorded, and would undergo appropriate curation.[3] This impact would be **less than significant after mitigation**.

> **Implementation Action:** The contractor will conduct employee training for the construction workers at the site on identification of paleontological resources. If paleontological resources are discovered in local borrow areas, during earthmoving activities, or in the river channel, the construction crew would immediately cease work in the vicinity of the find. A paleontologist approved by Reclamation and/or CSLC staff will evaluate the resource and prepare a recovery plan in accordance with SVP Guidelines. Recommendations in the recovery plan will be implemented before construction activities could resume at the site.
>
> **Location:** Construction areas with active excavation.

[3] Curation is management and care of collections according to standard professional practice, which may include inventorying, accessing, labeling, cataloging, identifying, evaluating, documenting, storing, maintaining, periodically inspecting, and/or conserving original collections.

Effectiveness Criteria: Performance tracking of this mitigation measure will be based on the stoppage in work in the vicinity of the find and meeting the recommendations in the recovery plan.

Responsible Agency: U.S. Department of the Interior, Bureau of Reclamation.

Monitoring/Reporting Action: Preparation of a recovery plan in accordance with SVP Guidelines, if paleontological resources are discovered during earthmoving activities and notification of California State Lands Commission (CSLC) monitors if find is on land under the CSLC's jurisdiction.

Timing: Mitigation would be ongoing over the construction timeframe.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B would include construction of Project features including a Compact Bypass channel, a new levee system with a wide, consensus-based floodplain encompassing the river channel, and the Compact Bypass Bifurcation Structure with fish passage facility and fish screen. Other key features include construction of a fish passage facility at the San Joaquin River control structure at the Chowchilla Bifurcation Structure, the re-route of Drive 10 ½ (across the Compact Bypass control structure), and the removal of the San Mateo Avenue crossing. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Borrow material would primarily be required for the construction of the levees, but it may also be used in the construction of other structures for foundation or backfill material. Levees may be constructed entirely of local borrow material, a mix of local and imported borrow material, or just imported borrow material. Borrow locations would be determined after a geotechnical exploration of potential local borrow areas is complete; the exploration would determine the suitability of local soils for use as borrow material. It is estimated that up to 350 acres of land would be needed for borrow areas. Some of the soils excavated to construct the Compact Bypass might be used for levee construction, and if this is possible, then the size of the borrow areas may be reduced.

Impact PAL-1 (Alternative B): ***Possible Damage to or Destruction of Unique Paleontological Resources.*** Refer to Impact PAL-1 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A with the following exception. The Compact Bypass design in Alternative B includes fewer grade control structures than the other alternatives, which would initiate channel bed erosion in Reach 2B to remove sediment that has been deposited in the San Joaquin River arm of Mendota Pool. This channel bed erosion is anticipated to be up to 7 to 8 feet deep near the upstream end of the Compact Bypass and gradually decrease to zero erosion approximately 4 miles further upstream (River Mile 210). Since this erosion would be of lake deposited sediments in the Mendota Pool and of the Holocene age, the erosion would not likely affect paleontological resources. However, Alternative B may uncover Pleistocene-age fossil remains during construction-related earthmoving activities in the Project area. This impact would be **potentially significant**.

Mitigation Measures PAL-1 (Alternative B): ***Stop Work if Paleontological Resources Are Encountered During Earthmoving Activities and Implement Recovery Plan.*** Refer to Mitigation Measures PAL-1 (Alternative A). The same measures would be used here. This impact would be **less than significant** after mitigation.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C would include construction of Project features including Fresno Slough Dam, a new levee system with a narrow floodplain encompassing the river channel, and the Short Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the Short Canal control structure and fish screen, the Chowchilla Bifurcation Structure fish passage facility, modification of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Borrow material would primarily be required for the construction of the levees, but it may also be utilized in the construction of other structures for foundation or backfill material. Levees may be constructed entirely of local borrow material, a mix of local and imported borrow material, or just imported borrow material. Borrow locations would be determined after a geotechnical exploration of potential local borrow areas is complete; the exploration would determine the suitability of local soils for use as borrow material. It is estimated that up to 350 acres of land is needed for borrow areas. Some of the soils excavated to construct the Short Canal might be used for levee construction, and if this is possible, then the size of the borrow areas may be reduced.

Impact PAL-1 (Alternative C): ***Possible Damage to or Destruction of Unique Paleontological Resources.*** Refer to Impact PAL-1 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A. This impact would be **potentially significant**.

Mitigation Measures PAL-1 (Alternative C): ***Stop Work if Paleontological Resources Are Encountered During Earthmoving Activities and Implement Recovery Plan.*** Refer to Mitigation Measures PAL-1 (Alternative A). The same measures would be used here. This impact would be **less than significant** after mitigation.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D would include construction of Project features including Fresno Slough Dam, a new levee system with a wide floodplain encompassing the river channel, and the North Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the North Canal bifurcation structure and North Canal fish passage facility, removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure, removal of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Borrow material would primarily be required for the construction of the levees, but it may also be utilized in the construction of other structures for foundation or backfill material. Levees may be constructed entirely of local borrow material, a mix of local and

imported borrow material, or just imported borrow material. Borrow locations would be determined after a geotechnical exploration of potential local borrow areas is complete; the exploration would determine the suitability of local soils for use as borrow material. It is estimated that up to 350 acres of land is needed for borrow areas. Some of the soils excavated to construct the North Canal might be used for levee construction, and if this is possible, then the size of the borrow areas may be reduced.

Impact PAL-1 (Alternative D): ***Possible Damage to or Destruction of Unique Paleontological Resources.*** Refer to Impact PAL-1 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A. This impact would be **potentially significant**.

Mitigation Measures PAL-1 (Alternative D): ***Stop Work if Paleontological Resources Are Encountered During Earthmoving Activities and Implement Recovery Plan.*** Refer to Mitigation Measures PAL-1 (Alternative A). The same measures would be used here. This impact would be **less than significant** after mitigation.

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19.0 Public Health and Hazardous Materials

This section describes the potential impacts that implementation of Project alternatives may have on public health and hazardous materials and explains the environmental setting, applicable regulatory framework, and appropriate mitigation measures.

19.1 Environmental Setting

This section describes the potential hazardous materials that would be handled, stored, and utilized and hazardous wastes that would be generated during Project construction. It also describes the procedures and engineering controls to be used to manage the Project's potential hazardous material and hazardous waste impacts to public health and the environment.

The Project area is located in Fresno and Madera Counties, near the city of Mendota, California. The Project includes the area of the San Joaquin River between the Chowchilla Bifurcation Structure and downstream of Mendota Dam in Fresno and Madera Counties, California. The size and location of the Project area, including the Project alternatives, are shown on Figure 1-2. The Project area includes land currently developed as farmland including row crops, orchards, and vineyards, and the associated roadway, utility, and drainage infrastructure. It also includes three farmhouses and associated outbuildings on the southeastern portion of the Project area.

Public health and hazardous materials include the following categories.

- Anthropogenic materials found at the site before the start of Project construction including vehicular fuels, other vehicular fluids such as antifreeze, lubricants, hydraulic fluid, and residual pesticide and herbicide impacts from past agricultural land uses.
- Anthropogenic materials used during construction or operation of the Project such as vehicular fuels and other vehicular fluids such as antifreeze, lubricants, and hydraulic fluid.
- Naturally occurring hazardous materials at the site such as metals, asbestos, and biological hazards in the soils.
- Project generated wastes, such as construction debris from the demolition of the existing structures within the Project area, including wood, roofing materials, metal, brick, cinder block, etc., contaminated soil from areas around potentially leaking underground storage tanks, waste treated wood from utility poles, fence posts, and grape stakes, metal from fencing and metal fence posts, and asphalt and concrete from roadway and building foundation removal.

19.1.1 Known Hazardous Material Sites

The San Joaquin River Restoration Program (SJRRP) retained Environmental Data Research to conduct an environmental regulatory agency database search to evaluate past and current project and surrounding land uses that may have potentially contributed to site contamination for the Project area. Various Federal and State regulatory databases were researched as part of the Draft Phase I Environmental Site Assessment (Appendix 19-A). The Draft Phase I Environmental Site Assessment included a review of historical aerial photographs and topographic maps of the Project area. A copy of the Phase I Environmental Site Assessment is provided in Appendix 19-A.

The database search of facilities on the Federal and State lists was reviewed for information on whether hazardous substances, wastes, or petroleum products have been improperly handled, stored, or disposed on the Project footprint and adjacent properties. The following sites were identified as hazardous material sites within the Project area or on the boundary of the Project area in the database report. These sites are described below.

- Paramount Farming Company, 10317 Eastside Drive, Firebaugh, CA.
- Mendota Solid Waste Disposal, ½ mile east of Bass Avenue, Mendota, CA.
- Frank A Logoluso Farms, 2369 San Mateo Avenue, Mendota, CA.
- AES Mendota/Covanta Mendota LP, 400 Guillen Parkway, Mendota, CA.

Paramount Farming Company, at 10317 Eastside Drive in Firebaugh, CA, is located on the northern boundary of the Project area. This site was listed in the Hazardous Waste Tracking System database, a California Department of Toxic Substances Control (DTSC) database of hazardous waste manifests (DTSC 2015). This site has been identified as having 2.4 tons of asbestos containing waste, and the disposal method is listed as landfill or surface impoundment that will be closed as a landfill (to include on-site treatment and/or stabilization). The site represents a potential environmental concern to the Project area due to the presence of asbestos containing waste.

Mendota Solid Waste Disposal facility is located ½ mile east of Bass Avenue, near Fresno Slough in Mendota, CA. The site is located on the southwestern boundary of the Project area, near Mendota Pool. The site was listed in the California Department of Resources, Recycling, and Recovery (CalRecycle) Solid Waste Information System database as a Solid Waste Facility/Landfill site. The Mendota Solid Waste Disposal facility was a permitted solid waste disposal site that was clean closed on December 31, 1981. The site is not expected to represent an environmental concern to the Project area.

Frank A. Logoluso Farms, at 2369 San Mateo Avenue in Mendota, CA, is located within the Project area south of the San Joaquin River. This site was listed in the Hazardous Waste Tracking System database, a DTSC database of hazardous waste manifests. This site has been identified as having 0.3753 tons of waste oil and mixed oil. The site is not expected to represent an environmental concern to the Project area.

AES Mendota/Covanta Mendota LP facility, at 400 Guillen Parkway in Mendota, CA, is located on the western boundary of the Project area, near Mendota Airport. The biomass power plant was listed in several Federal and State databases. The AES Mendota/Covanta Mendota LP facility is located downgradient of the Project area and on the southwestern boundary; therefore, the site is not expected to represent an environmental concern to the Project area.

The following historic recognized environmental condition was identified in connection with the Project area. Because the Project area was historically used as farmland, pesticide and herbicide residuals may be present in the soil. However, features were not identified (e.g., impoundments, bulk storage facilities or crop dusting air strips) that suggested the handling or storage of significant quantities of pesticides and/or herbicides in the Project area.

19.1.2 Exposure to Disease

Public health hazards also include exposure to disease vectors. Diseases found in the Project vicinity include West Nile virus (WNV), Hantavirus, and valley fever.

Exposure to West Nile Virus

All mosquito species are potential vectors that can cause disease to pets, domestic animals, wildlife, and humans. Public concern regarding WNV, a disease transmitted to humans, has increased since the virus was first detected in the United States in 1999. WNV is mosquitos borne arbovirus that is not transmitted from person to person contact. Approximately 20 percent of infected persons develop symptoms. There were 2,765 cases reported in California from 2003 to 2008 (California Department of Public Health [CDPH] 2010). A mosquito acquires WNV by feeding on the blood of infected birds. All species of mosquitoes require standing water to complete their growth cycle; therefore, any standing body of water represents a potential mosquito breeding area. WNV is transmitted by infected mosquito bites.

Local mosquito abatement districts implement controls such as spraying to protect public health. In Madera County, the mosquito abatement district is the Madera County Mosquito and Vector Control District located in Madera. In Fresno County, the mosquito abatement district is the Fresno Westside Mosquito Abatement District in Firebaugh.

Exposure to Hantavirus

Hantavirus is an often fatal lung disease transmitted by rodents. It is transmitted in California only by deer mice. Most transmittal to humans is through breathing air contaminated with rodent droppings or urine. This happens most frequently in small closed spaces. Infrequent transmittal occurs from consuming food contaminated with rodent droppings or urine or touching surfaces contaminated with rodent dropping or urine and then putting fingers in the mouth, or being bitten by an infected rodent (CDPH 2009a). Demolition of buildings may expose workers to rodent wastes that may be contaminated with Hantavirus.

Exposure to Valley Fever

Valley fever is caused by a fungus that usually affects the lungs. People become infected by breathing dust contaminated with the fungal spores. Approximately 150,000 cases occur in the United States annually, although approximately half of the cases do not produce symptoms. It is not transmitted from person to person (CDPH 2009b).

19.2 Regulatory Setting

This section discusses the regulatory setting for public health and hazardous materials in the Project area.

19.2.1 Federal

Table 19-1 provides a summary of Federal environmental hazardous materials laws, ordinances and regulations, and indicates the agencies providing regulatory oversight. Selected Federal laws and regulations pertaining to public health and hazardous materials in the Project area are also discussed briefly below.

Table 19-1.
Summary of Federal Regulations Applicable to Hazardous Materials/Waste Handling

Authority	Administering Agency	Requirements and Compliance
CERCLA, as amended by SARA; Title III, Emergency Planning and Community Right-to-Know Act of 1986, 42 USC 11001 et seq., 40 CFR Parts 302, 355, 370, and 372.	EPA Region IX; National Response Center; California OES; Fresno County Department of Public Health - Environmental Health Division; Madera County Department of Environmental Health	CERCLA release notification requirements; SARA Title III includes reporting requirements for storing, handling, or producing regulated substances.
29 CFR 1910 et seq. 29 CFR 1926 et seq.	Occupational Safety and Health Administration (OSHA)	Requirements pertaining to employers whose employees handle hazardous materials and extremely hazardous chemicals.
Clean Air Act Amendments of 1990, Section 112(r), Accidental Release Prevention Program, 42 USC 7412 (r), 40 CFR Part 68	EPA Region IX; California OES; Fresno County Department of Public Health - Environmental Health Division; Madera County Department of Environmental Health	Requirements pertaining to risk management of regulated substances.
Clean Water Act, Spill Prevention, Control, and Countermeasure Plan, 40 CFR 112	EPA Region IX, Fresno County Department of Public Health - Environmental Health Division; Madera County Department of Environmental Health	Requirements designed to prevent the discharge of oil into navigable waters.
RCRA, 42 USC 6901 et seq., 40 CFR 260 et seq., 49 CFR 172, 173, and 179	EPA Region IX	Requirements for a hazardous waste generator identification number coordinated through the EPA and the DTSC.

Key:
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR = Code of Federal Regulations
DTSC = California Department of Toxic Substances Control
EPA = U.S. Environmental Protection Agency
OES = Office of Emergency Services
OSHA = Occupational Safety and Health Administration
RCRA = Resource Conservation and Recovery Act
SARA = Superfund Amendments and Reauthorization Act of 1986
USC = United States Code

Hazardous Materials Handling

At the Federal level, the principal agency regulating the generation, transport, and disposal of hazardous substances is U.S. Environmental Protection Agency (EPA), under the authority of the Resource Conservation and Recovery Act (RCRA). The RCRA established an all-encompassing Federal regulatory program for hazardous substances that is administered by EPA. Under the RCRA, EPA regulates the generation, transportation, treatment, storage, and disposal of hazardous substances. The RCRA was amended in 1984 by the Hazardous and Solid Waste Amendments of 1984, which specifically prohibits the use of certain techniques to dispose of various hazardous substances. The Federal Emergency Planning and Community Right to Know Act of 1986 imposes hazardous-materials planning requirements to help protect local communities in the event of accidental release of hazardous substances. EPA has delegated much of the RCRA requirements to the DTSC.

Worker Safety Requirements

The U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), is responsible at the Federal level for ensuring worker safety. OSHA sets Federal standards for implementing workplace training, exposure limits, and safety procedures for the handling of hazardous substances (as well as other hazards). OSHA also establishes criteria by which each state can implement its own health and safety program.

Regulation of Polychlorinated Biphenyls

The Toxic Substances Control Act of 1976 (United States Code [USC] Title 15, Section 2605) banned the manufacture, processing, distribution, and use of polychlorinated biphenyls (PCBs) in totally enclosed systems. The EPA Region 9 PCB Program regulates remediation of PCBs in several states, including California. Title 40 of the Code of Federal Regulations (CFR), Section 761.30(a)(1)(vi)(A) states that all owners of electrical transformers containing PCBs must register their transformers with EPA. Specified electrical equipment manufactured between July 1, 1978, and July 1, 1998, that does not contain PCBs must be marked by the manufacturer with the statement “No PCBs” (Section 761.40[g]). Transformers and other items manufactured before July 1, 1978, and containing PCBs must be marked as such.

Asbestos

The Federal Clean Air Act (CAA) was enacted in 1970. The most recent major amendments by Congress were made in 1990. The CAA required EPA to establish primary and secondary national ambient air quality standards. It also required each state to prepare an air quality control plan, referred to as a State Implementation Plan. Section 112 of the CAA defines "hazardous air pollutants" and sets threshold limits. Asbestos-containing substances are regulated by EPA under the CAA. Additional information about the CAA is presented in Chapter 4.0, "Air Quality."

Airport and Airspace Safety

Part 77 of the Federal Aviation Regulations, "Objects Affecting Navigable Airspace," has been adopted as a means of monitoring and protecting the airspace required for safe operation of aircraft and airports. Objects that exceed certain specified height limits constitute airspace obstructions. Federal Aviation Regulations Section 77.13 requires that the Federal Aviation Administration be notified of proposed construction or alteration of certain objects in a specified vicinity of an airport.

19.2.2 State of California

Table 19-2 provides a summary of State environmental hazardous materials laws, ordinances and regulations, and indicates the agencies providing regulatory oversight. Selected State laws and regulations pertaining to public health and hazardous materials in the Project area are also discussed briefly below.

Table 19-2.
Summary of State Regulations Applicable to Hazardous Materials/Waste Handling

Authority	Administering Agency	Requirements and Compliance
California Health & Safety Code, Chapter 6.95, Art. 1	Fresno County Department of Public Health - Environmental Health Division; Madera County Department of Environmental Health	Facilities handling hazardous materials are required to submit a Hazardous Materials Business Plan (HMBP) to the Certified Uniform Program Agency.
California Health & Safety Code § 25270	Central Valley Regional Water Quality Control Board	Above ground petroleum storage tanks must be registered with the State Water Resources Control Board.
8 CCR § 5194	Fresno County Department of Public Health - Environmental Health Division; Madera County Department of Environmental Health	Requirements pertaining to employers whose employees are exposed to dusts, fumes, mists, vapors, and gases.
California Health & Safety Code §§ 25500–25520; 19 CCR §§ 2720–2734	Fresno County Department of Public Health - Environmental Health Division; Madera County Department of Environmental Health	Requirement to prepare an HMBP.
California Accidental Release Prevention Program, California Health & Safety Code § 25531 et seq., 19 CCR Division 2, Chapter 4.5	California OES, Fresno County Department of Public Health - Environmental Health Division; Madera County Department of Environmental Health	HMBP requirements and requirements to prepare a risk management plan.

Table 19-2.
Summary of State Regulations Applicable to Hazardous Materials/Waste Handling

Authority	Administering Agency	Requirements and Compliance
8 CCR § 339, § 3200 et seq., § 5139 et seq., § 5160 et seq., § 5189 et seq.	Cal/OSHA	Requirements pertaining to the control and management of hazardous substances.
Hazardous Waste Control Act, California Health & Safety Code; 22 CCR § 66001 et seq.	Fresno County Department of Public Health - Environmental Health Division; Madera County Department of Environmental Health	Requirements pertaining to the management of hazardous waste.
22 CCR § 67100, Hazardous Waste Source Reduction and Management Review	Fresno County Department of Public Health - Environmental Health Division; Madera County Department of Environmental Health	Requirements pertaining to waste generators developing a plan for reducing their hazardous wastes.
22 CCR §§ 66260-66270	Fresno County Department of Public Health - Environmental Health Division; Madera County Department of Environmental Health	Requirements pertaining to hazardous waste regulations for generators and transporters of hazardous wastes and owners of hazardous waste Treatment, Storage, and Disposal Facilities.
Porter-Cologne Water Quality Control Act	Central Valley Regional Water Quality Control Board	Reportable quantities of hazardous wastes and hazardous materials are established by the RWQCB based on their potential to degrade the waters of the state.
Uniform Fire Code, Article 80 and others	Fresno County Fire Protection District; Madera County Fire Department	Provisions regarding fire protection and neutralization systems for hazardous materials.
California Vehicle Code § 32100.5	Caltrans	Requirements for transportation materials that may pose an inhalation hazard.
State Building Standard Code	Various agencies	Requirements pertaining to fire prevention, building safety, etc.

Key:
Cal/OSHA = California Occupational Safety and Health Administration
Caltrans = California Department of Transportation
CCR = California Code of Regulations
HMBP = Hazardous Material Business Plan
OES = Office of Emergency Services
RWQCB = Regional Water Quality Control Board

Hazardous Materials Handling

The California Hazardous Materials Release Response Plans and Inventory Law of 1985 requires preparation of hazardous materials business plans and disclosure of hazardous materials inventories. A business plan includes an inventory of hazardous materials handled, facility floor plans showing where hazardous materials are stored, an emergency response plan, and provisions for employee training in safety and emergency response procedures (Health & Saf. Code, Div. 20, Ch. 6.95, Art. 1). Statewide, DTSC has primary regulatory responsibility for managing hazardous materials, with delegation of authority to local jurisdictions that enter into agreements with the State. Local agencies administer these laws and regulations.

Worker Safety Requirements

California Occupational Safety and Health Administration (Cal/OSHA) assumes primary responsibility for developing and enforcing workplace safety regulations in California. Cal/OSHA regulations pertaining to the use of hazardous materials in the workplace (Cal. Code Regs., tit. 8) include requirements for safety training, availability of safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and preparation of emergency action and fire prevention plans.

Emergency Response to Hazardous Materials Incidents

California has developed an emergency response plan to coordinate emergency services provided by Federal, State, and local governments and private agencies. Response to hazardous material incidents is one part of this plan. The plan is managed by the Governor's Office of Emergency Services (OES), which coordinates the responses of other agencies, including the California Environmental Protection Agency (Cal/EPA), California Highway Patrol (CHP), California Department of Fish and Wildlife, and Central Valley Regional Water Quality Control Board.

Hazardous Materials Transport

The U.S. Department of Transportation (DOT) regulates transportation of hazardous materials between states. State agencies with primary responsibility for enforcing Federal and State regulations and responding to hazardous materials transportation emergencies are the CHP and California Department of Transportation (Caltrans). Together, these agencies determine container types used and license hazardous waste haulers for transportation of hazardous waste on public roads.

The DOT Federal Railroad Administration enforces the hazardous materials regulations, which are promulgated by the Pipeline and Hazardous Materials Safety Administration for rail transportation. These regulations include requirements that railroads and other transporters of hazardous materials, including shippers, have and adhere to security plans and train their employees involved in offering, accepting, or transporting hazardous materials on both safety and security matters.

California Accidental Release Prevention Program

The goal of the California Accidental Release Prevention Program is to reduce the likelihood and severity of consequences of extremely hazardous materials releases. Any business that handles regulated substances (chemicals that pose a major threat to public health and safety or the environment because they are highly toxic, flammable, or explosive, including ammonia, chlorine gas, hydrogen, nitric acid, and propane) is required to prepare a risk management plan. A risk management plan describes current and past practices and releases, what the impact of releases may be, and what the business does or plans to do to prevent releases and minimize their impact if they occur.

Government Code Section 65962.5 (Cortese List)

The provisions of Government Code section 65962.5 are commonly referred to as the "Cortese List" (after the legislator who authored the legislation that enacted it). The *Cortese List* is a planning document used by State and local agencies to comply with California Environmental Quality Act (CEQA) requirements in providing information

about the location of hazardous materials release sites. Government Code section 65962.5 requires Cal/EPA to develop an updated *Cortese List* annually at minimum. DTSC is responsible for a portion of the information contained in the *Cortese List*. Other California State and local government agencies are required to provide additional hazardous material release information for the *Cortese List*.

Multi-Hazard Mitigation Plan

OES issued the *State of California Multi-Hazard Mitigation Plan* (OES 2013) in October 2013. It provides an updated and comprehensive description of California's historical and current hazard analysis, mitigation strategies, goals and objectives. The Federal Disaster Mitigation Act required all State emergency services agencies to issue such plans by November 1, 2004, for the states to receive Federal grant funds for disaster assistance and mitigation under the Stafford Act (44 CFR 201.4).

Public Resources Code and California Code of Regulations, Title 14, Chapter 4

California Department of Conservation Division of Oil, Gas, and Geothermal Resources (DOGGR) is responsible for section 3000 et seq. of the Public Resources Code and California Code of Regulations, Title 14, Chapter 4, which address the drilling, operation, maintenance, plugging, and abandonment of onshore and offshore oil, gas, and geothermal wells. In addition, DOGGR's programs include well permitting and testing, safety inspections, oversight of production and injection projects, environmental lease inspections, idle-well testing, inspecting oilfield tanks, pipelines, and sumps, hazardous and orphan well plugging and abandonment contracts, and subsidence monitoring (DOGGR 2012).

19.2.3 Regional and Local

Regional or local plans pertain to public health and hazardous materials in the Project area are discussed below.

General Plans

The Fresno County General Plan (Fresno County 2000) and the Madera County General Plan (Madera County 1995) identify goals and policies that describe approaches to public health and hazardous materials used by each county. The Fresno County General Plan Health and Safety element sets policies on wildland fires (Policies HS-B.1 and HS-B.5), airport hazards (Policy HS-E.1), and hazardous materials (Policy HS-F.5). Similarly, the Madera County General Plan provides policies on emergency services and fire protection (Policies 3.G.5, 3.H.2, and 6.C.10), airport hazards (Policy 6.D.1), and hazardous materials (Policies 6.G.4 and 6.G.5).

19.3 Environmental Consequences and Mitigation Measures

This section describes how the potential hazards and hazardous materials impacts are evaluated, what the impacts may be, and how the impacts would be mitigated.

19.3.1 Impact Assessment Methodology

This section provides the methodology that was used to evaluate the potential human health and environmental impacts of hazardous materials related to the Project.

Various Federal and State regulatory databases were researched for past and current land uses that may have potentially contributed to site contamination for the environmental setting/existing conditions section. A Phase I Environmental Site Assessment (Phase I) was conducted on the Project area to evaluate past and current land uses that may have potentially contributed to site contamination that could impact Project construction or have longer term impacts on Project operation. Various Federal and State of California regulatory databases were researched as part of this Phase I effort.

Federal, State, and local statutes regulating hazardous waste were reviewed for the analysis of potential impacts associated with hazards and hazardous materials. The applicable regulations establish handling and management requirements associated with hazards and hazardous materials management.

The transport, use, and disposal of hazardous materials that may be involved in Project construction were described. The potential for upset or accidents involving hazardous materials on the Project site during and after construction completion was discussed. The emission of hazardous or acutely hazardous materials from the Project during and after construction within ¼ mile of an existing school was evaluated. The locations of known hazardous waste sites in the Project area were evaluated; this evaluation included oil and gas wells in the area. The potential impacts of the use of hazardous materials and/or site construction work on public airports within 2 miles of the Project was evaluated. Potential impacts to private airstrips near the Project were discussed. Potential impacts to implementation of local emergency response plans were evaluated. The Project's potential to contribute or cause wildland fires (from the operation of construction equipment) were evaluated.

19.3.2 Significance Criteria

The thresholds of significance for impacts are based on the Environmental Checklist Form in Appendix G of the State CEQA Guidelines, as amended. These thresholds also encompass the factors taken into account under the National Environmental Policy Act (NEPA) to determine the significance of an action in terms of its context and the intensity of its effects. Impacts resulting from the Project would be significant if they would cause any of the following:

- Create a substantial hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Create a substantial hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ mile of an existing or proposed school.

- Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would create a substantial hazard to the public or the environment.
- Result in a safety hazard for people residing or working in the Project area for areas designated in an airport land use plan, within 2 miles of an airport, or in the vicinity of a private airstrip.
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
- Expose people or structures to a substantial risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.
- Expose people to new or increased risk from disease vectors.

19.3.3 Impacts and Mitigation Measures

This section provides an evaluation of the long-term and temporary effects of the Project alternatives on public health and hazardous materials. It includes analyses of potential effects relative to No-Action conditions in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. With respect to public health and hazardous materials, the environmental impact issues and concerns are:

1. Creation of a Substantial Hazard through the Routine Transport, Use, or Disposal of Hazardous Materials or through Reasonably Foreseeable Upset and Accident Conditions Involving the Release of Hazardous Materials.
2. Increased Exposure to Hazardous Materials of People Residing or Working in the Project Area.
3. Creation of a Substantial Hazard from Disturbance of Known Hazardous Material Sites.
4. Creation of a Substantial Hazard from Mobilization of Soil Contaminants on the Floodplain.
5. Exposure of People to Increased Risk of Diseases.
6. Creation of a Substantial Hazard from Decommissioned Wells.
7. Increased Hazardous Emissions or Handling of Hazardous Materials, Substances, or Wastes within ¼ mile of a School.
8. Exposure of People or Structures to a Substantial Risk of Loss, Injury, or Death involving Wildland Fires.
9. Creation of a Substantial Hazard in Areas Designated by Airport Land Use Plans, within 2 miles of an Airport, or in the Vicinity of a Private Airstrip.
10. Impairment of the Implementation or Physical Interference with an Adopted Emergency Response or Emergency Evacuation Plan.

Other public health and hazardous materials related issues covered in the Program Environmental Impact Statement/Report are not covered here because they are

programmatic in nature and/or are not relevant to the Project area. This includes mobilization of naturally occurring asbestos.

Issues Eliminated from Further Analysis

Mobilization of Naturally Occurring Asbestos. Inhalation of naturally occurring asbestos can cause lung cancer and other long-term respiratory problems. Due to local Project area geology, it is unlikely that naturally occurring asbestos is present in the site soils. Therefore, impacts from naturally occurring asbestos are not evaluated.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the SJRRP would be implemented, including habitat restoration in other reaches, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these activities would not achieve the Settlement goals. The potential effects of the No-Action Alternative are described below. The analysis is a comparison to existing conditions, and no mitigation is required for No-Action.

Impact HAZ-1 (No-Action Alternative): *Creation of a Substantial Hazard through the Routine Transport, Use, or Disposal of Hazardous Materials or through Reasonably Foreseeable Upset and Accident Conditions Involving the Release of Hazardous Materials.* The No-Action Alternative would not involve Project-related construction or operations/maintenance activities involving the storage, use, or transport of hazardous materials (or the accidental release of those materials) and would not have the potential to create a substantial hazard to the public or the environment. Although hazardous materials are used under existing conditions (e.g., for agricultural and/or Program-related activities), no additional hazardous materials would be used under No-Action. There would be **no impact** relative to existing conditions.

Impact HAZ-2 (No-Action Alternative): *Increased Exposure to Hazardous Materials for People Residing or Working in the Project Area.* Project-related actions and construction activities would not occur under the No-Action Alternative. Existing ground-disturbing activities and agricultural spraying activities would continue to occur into the future. The effect of these activities may include exposure of construction workers or others in the area to existing hazardous materials including asbestos; petroleum hydrocarbons, pesticides, herbicides, and fertilizers; contaminated debris; elevated levels of chemicals that could be hazardous; or hazardous substances. However, implementation of the No-Action Alternative would not increase exposure to hazardous materials. There would be **no impact** relative to existing conditions.

Impact HAZ-3 (No-Action Alternative): *Creation of a Substantial Hazard from Disturbance of Known Hazardous Material Sites.* Project-related actions and construction activities would not occur under the No-Action Alternative. Therefore, implementation of the No-Action Alternative would not increase public exposure to hazardous materials in known hazardous materials sites. There would be **no impact** relative to existing conditions.

Impact HAZ-4 (No-Action Alternative): ***Creation of a Substantial Hazard from Mobilization of Soil Contaminants on the Floodplain.*** Under No-Action, flows would be constrained in Reach 2B by the existing levees. Implementation of the No-Action Alternative would not mobilize soil contaminants located outside of existing levees. There would be **no impact**.

Impact HAZ-5 (No-Action Alternative): ***Exposure of People to Increased Risk of Diseases.*** Prominent areas for WNV to occur include wetted portions of the San Joaquin River that provide mosquito habitat. Exposure to Valley Fever can occur during earth-moving activities, which release spores living in the soil. The No-Action Alternative would not involve Project-related construction or operations/maintenance activities. People residing or working in the Project area have some degree of exposure to WNV and Valley Fever under existing conditions. Implementation of the No-Action Alternative would not increase the risk of exposure to WNV or Valley Fever. **No impact** would occur relative to existing conditions.

Impact HAZ-6 (No-Action Alternative): ***Creation of a Substantial Hazard from Decommissioned Wells.*** The No-Action Alternative would not involve any Project-related actions in addition to ongoing agricultural or Program-related operations. For this reason, Project-related ground-disturbing activities that could disrupt an active, idle, or abandoned well would not occur. As a result, implementing the No-Action Alternative would not have the potential to create a new or increased hazard from idle and abandoned wells. **No impact** would occur.

Impact HAZ-7 (No-Action Alternative): ***Increased Hazardous Emissions or Handling of Hazardous Materials, Substances, or Wastes within ¼ mile of a School.*** The No-Action Alternative would not involve any Project-related actions in addition to ongoing operations or operations planned in the future in the vicinity of the Project area. Although schools are located in the cities of Firebaugh and Mendota, these schools are located more than ¼ mile from the Project area. The No-Action Alternative would not have the potential to create a new or increased hazard to school safety because Project-related construction or operations/maintenance activities would not occur under this alternative. **No impact** would occur.

Impact HAZ-8 (No-Action Alternative): ***Exposure of People or Structures to a Substantial Risk of Loss, Injury, or Death involving Wildland Fires.*** The No-Action Alternative would not include any activities that would increase the risk of sparking a wildland fire. Therefore, impacts related to the creation of hazards associated with wildland fires would not occur. There would be **no impact**.

Impact HAZ-9 (No-Action Alternative): ***Creation of a Substantial Hazard in Areas Designated by Airport Land Use Plans, within 2 miles of an Airport, or in the Vicinity of a Private Airstrip.*** The No-Action Alternative would not include any Project actions that could create a new or increased hazard to aircraft safety. Therefore, impacts related to the creation of a new or increased hazard to aircraft safety would not occur. There would be **no impact**.

Impact HAZ-10 (No-Action Alternative): ***Impairment of the Implementation or Physical Interference with an Adopted Emergency Response or Emergency Evacuation Plan.*** Project actions would not be implemented under the No-Action Alternative. Therefore emergency response and evacuation plans would not be affected by Project-related actions. There would be **no impact**.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would include construction of Project facilities including a Compact Bypass channel, a new levee system encompassing the existing river channel in a narrow floodplain, and the South Canal. Other key features include construction of the Mendota Pool Dike (separating the San Joaquin River and Mendota Pool), a fish barrier below Mendota Dam, and the South Canal bifurcation structure with fish passage facility and fish screens, modification of the San Mateo Avenue crossing, and the removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Impact HAZ-1 (Alternative A): ***Creation of a Substantial Hazard through the Routine Transport, Use, or Disposal of Hazardous Materials or through Reasonably Foreseeable Upset and Accident Conditions Involving the Release of Hazardous Materials.*** In contrast to the No-Action Alternative, Alternative A would use hazardous materials in varying amounts during construction and operation/maintenance activities. If these materials are not transported, used, stored or disposed of appropriately, they could impact the environment and/or public health. Materials typically used during construction that could contain hazardous substances include paints, solvents, cements, glues, lubricants, and fuels. Materials used during Project operation/maintenance may include lubricants, fuels, and paints. Construction workers and others could be exposed to hazards and hazardous materials as a result of improper handling or use during construction activities, transportation accidents, or fires, explosions, or other emergencies. Construction workers and others could also be exposed to hazards associated with accidental releases of hazardous materials, which could result in adverse health effects.

The use, storage, and transport of hazardous materials are regulated by Federal, State, and local agencies, and compliance with relevant laws is required during Project construction and operation. Transportation of hazardous materials on area roadways is regulated by the CHP and Caltrans. Hazardous materials regulations, which are codified in California Code of Regulations, Titles 8, 22, and 26, and their enabling legislation set forth in the California Health and Safety Code (§ 25100 et seq.), were established at the State level to ensure compliance with Federal regulations to reduce the risk to human health and the environment from the routine use of hazardous substances. These regulations must be implemented, as appropriate, and are monitored by the State (e.g., Cal/OSHA in the workplace, DTSC for hazardous waste, and California Air Resources Board for lead) and/or local jurisdictions (i.e., Madera County Department of Environmental Health and Fresno County Department of Public Health, Environmental Health Division).

All construction would be required to comply with Cal/EPA's Unified Program; regulated activities would be managed by Madera County Department of Environmental

Health and/or Fresno County Department of Public Health, Environmental Health Division in accordance with the regulations for their respective jurisdiction's Unified Program (e.g., hazardous materials release response plans and inventories, California Uniform Fire Code hazardous material management plans and inventories). Such compliance would reduce the potential for accidental release of hazardous materials during construction and improvement activities. As a result, compliance with each county's Unified Program would lessen the risk of exposure of construction workers and others to accidental release of hazardous materials.

Workplace regulations addressing the use, storage, and disposal of hazardous materials included in California Code of Regulations, Title 8 also would apply to Project construction and improvement activities. Compliance with these regulations would be monitored by local agency, such as Madera County Department of Environmental Health and/or Fresno County Department of Public Health, Environmental Health Division when they perform inspections for flammable and hazardous materials storage. Other mechanisms in place to enforce the Title 8 regulations include compliance audits and reporting to State and local agencies. Implementation of the workplace regulations would further reduce the potential for hazardous materials releases during project construction and improvement activities.

The Project would implement and comply with Federal, State, and local hazardous materials regulations monitored by the State (e.g., Cal/OSHA, DTSC, CHP) and/or local jurisdictions (e.g., Madera County Department of Environmental Health, Fresno County Department of Public Health, Environmental Health Division); therefore, impacts related to creation of substantial hazards to the public through routine transport, use, disposal, and risk of upset would be unlikely with Project construction activities.

When comparing Alternative A to existing conditions, impacts to the public or the environment through the use of hazardous materials would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Therefore, this impact would be **less than significant**.

Impact HAZ-2 (Alternative A): ***Increased Exposure to Hazardous Materials for People Residing or Working in the Project Area.*** In contrast to the No-Action Alternative, construction and operation/maintenance activities would occur in the Project area under Alternative A. As a result, implementing this alternative could expose construction workers and others to hazardous materials that could be inadvertently spilled or otherwise spread. Hazardous materials used by the Project are expected to be limited to vehicular fuel, antifreeze, and lubricant use for earthmoving and transportation vehicles; lubricants and paints used for maintaining structures, fish passage facilities, and fish screens; and fuels used to support sediment removal near Project facilities. Existing hazardous materials in Project area could include asbestos, petroleum hydrocarbons, pesticides, herbicides, fertilizers, contaminated debris, elevated levels of chemicals that could be hazardous, or hazardous substances. Alternative A would involve construction and operation/maintenance activities in agricultural areas which are likely to contain hazardous materials.

Potential hazardous materials issues include hazardous building components from demolition of existing facilities, release of pesticides/herbicides from demolition of existing agricultural facilities, disturbance of discolored or odiferous soils, and underground storage tank removal. These issues were identified as potential concerns in the Project area.

- *Hazardous Building Components from Demolition of Existing Facilities.* Hazardous building components include asbestos containing materials, lead based paint and PCBs containing materials and universal wastes such as: electronic devices, batteries, electric lamps, e.g., fluorescent lighting tubes, mercury containing equipment, cathode ray tubes, and non-empty aerosol cans from demolition of existing buildings (DTSC 2010). If these items are not found and removed before demolition, contaminants can be released.
- *Release of Pesticide and Herbicides from Demolition of Existing Agricultural Facilities.* Residual bags or containers of pesticides or herbicides may be found in the process of demolishing agricultural structures within the Project footprint. Failure to manage these materials properly could cause **i**mpacts to soil, surface water, and groundwater.
- *Disturbance of Discolored or Odiferous Soils.* If discolored or odiferous soils are found during the Project earthwork it may indicative a hazardous materials spill or leak. Failure to identify and manage these soils can cause impacts to surface water and groundwater.
- *Removal of Underground Storage Tanks.* Potentially, underground storage tanks may need to be removed from houses or farms that would be demolished to construct the Project. If the underground storage tanks are not emptied and the contents managed properly, the resulting spills and leaks can impact the local soil and groundwater.

Implementing Alternative A in the Project area would have the potential to expose construction workers and others to hazardous materials.

When comparing Alternative A to existing conditions, impacts to construction workers and the public would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). This impact would be **potentially significant**.

Mitigation Measure HAZ-2A (Alternative A): *Follow General Hazardous Materials Guidelines.* Construction activities in the Project area will be modified to minimize adverse effects to the public or the environment, including implementing general hazardous material guidelines such as: (1) using less toxic alternative materials when available, (2) minimizing leaks and spills, and (3) following regulatory guidelines.

> **Implementation Action:** The contractors will follow regulatory guidelines for transportation, storage, use, and disposal of hazardous materials. This includes training of personnel using hazardous materials, use of secondary containment, storing incompatible materials separately, having emergency and spill clean-up

equipment on-site, and contracts in place for emergency responses, if needed. This also includes requirements for delivery of fuels and lubricants by service trucks to the construction site.

The following measures will be used to minimize spills and leaks of hazardous materials used during Project construction.

- The contractors will develop a project-specific Health and Safety Plan and Spill Prevention Plan for the work.
- The contractors will provide hazardous materials material safety data sheets to Project personnel.
- The contractors will use personal protective equipment during hazardous materials work.
- The contractors will use good housekeeping methods on the Project worksite.
- The contractors will use proper sampling, analysis, characterization and disposal of hazardous waste. Spills and leaks of hazardous materials will be disposed of appropriately.
- Less toxic alternative materials will be used when available.
- The contractor will use licensed contractors and transportation companies for hazardous materials work.

Location: Project areas with active construction or used by construction personnel including access roads, staging and storage areas, and borrow sites.

Effectiveness Criteria: Effectiveness will be based on incidence of hazardous material spills.

Responsible Agency: U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and California State Lands Commission (CSLC).

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Ongoing over the construction timeframe.

Mitigation Measure HAZ-2B (Alternative A): ***Properly Dispose of Hazardous Building Components.*** Construction activities in the Project area will be modified to minimize adverse effects to the public or the environment, including proper disposal of hazardous building components such as lead based paint, components with PCBs, and asbestos containing material.

Implementation Action: Hazardous building components will be handled in the following manner.

- Building components will be tested for lead based paint and PCBs before demolition is conducted. Remediate poor condition lead based paint and

building components with PCBs before the remaining building is demolished. Properly characterize, profile, and dispose of lead based paint and PCB containing materials.

- The contractor will test structures to be demolished for asbestos containing materials. If asbestos containing materials are present, use trained workers to remove the asbestos containing materials before the demotion is conducted. Asbestos containing materials wastes will be disposed of in an approved landfill.
- The contractor will remove, store, package, and ship universal wastes (e.g., fluorescent lighting tubes) off-site for proper disposal.

Location: Construction areas with potential hazardous building components.

Effectiveness Criteria: Effectiveness will be based on compliance with health and safety guidelines.

Responsible Agency: Reclamation, CSLC, and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Ongoing over the construction timeframe.

Mitigation Measure HAZ-2C (Alternative A): ***Properly Dispose of Pesticides.*** Construction activities in the Project area will be modified to minimize adverse effects to the public or the environment, including proper disposal of pesticides.

Implementation Action: If pesticide or herbicide containers are found during the building demolition, the contents will be recycled to the degree possible that is consistent with the product label. Unusable materials and containers will be disposed of in accordance with applicable regulations.

Location: Project areas with active construction or used by construction personnel with pesticide or herbicide containers.

Effectiveness Criteria: Effectiveness will be based on compliance with disposal guidelines.

Responsible Agency: Reclamation, CSLC, and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Ongoing over the construction timeframe.

Mitigation Measure HAZ-2D (Alternative A): ***Properly Manage Discolored or Odiferous Soils.*** Construction activities in the Project area would be modified to

minimize adverse effects to the public or the environment, including proper management of discolored or odiferous soils.

Implementation Action: If discolored or odiferous soils are found during the Project earthwork, the contractor will excavate the soil using Hazardous Waste and Emergency Response 40-hour trained personnel. Engineering dust control methods, such as soil wetting and using dust suppressants, will be used during movement of impacted soil. Appropriate monitoring and reporting is required during the construction work.

The contractor will segregate the soil on plastic sheeting, sample, analyze, characterize and profile the soil for on-site use, off-site reuse, or off-site disposal in accordance with applicable regulations. While the soil pile is not being worked, it will be covered to minimize dust and odor generation.

Location: Project areas with active construction or used by construction personnel with discolored or odiferous soils.

Effectiveness Criteria: Effectiveness will be based on compliance with regulatory guidelines.

Responsible Agency: Reclamation, CSLC, and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Ongoing over the construction timeframe.

Mitigation Measure HAZ-2E (Alternative A): ***Properly Remove Underground Storage Tanks.*** Construction activities in the Project area will be modified to minimize adverse effects to the public or the environment, including proper removal of underground storage tanks.

Implementation Action: Removal of underground storage tanks will be handled in the following manner.

- The tanks will be emptied and the contents used or recycled by a licensed underground storage tank contractor. The tanks can also be recycled.
- Contaminated soil will be excavated, stockpiled on plastic sheeting, sampled, analyzed, characterized, profiled, and disposed of in compliance with relevant regulations (e.g., California Underground Storage Tank Regulations [State Water Resources Control Board 2012]).

Location: Project areas with active construction or used by construction personnel including access roads, staging and storage areas, and borrow sites with underground storage tanks.

Effectiveness Criteria: Effectiveness will be based on compliance with regulatory guidelines.

Responsible Agency: Reclamation, CSLC, and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Ongoing over the construction timeframe.

Implementation of Mitigation Measures HAZ-2A through HAZ-2E would reduce exposure of construction workers and others to existing hazardous materials to a less-than-significant level. This impact would be **less than significant with mitigation**.

Impact HAZ-3 (Alternative A): ***Creation of a Substantial Hazard from Disturbance of Known Hazardous Material Sites.*** In contrast to the No-Action Alternative, Project construction and other ground-disturbing activities could occur under Alternative A at a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, could create a significant hazard to the public or the environment. SJRRP conducted a Draft Phase I Environmental Site Assessment to evaluate known hazardous materials sites in the Project area or vicinity (Appendix 19-A). The Draft Phase I Environmental Site Assessment search included standard regulatory agency databases which identified potential hazardous materials sites.

Oil and Gas Wells. There are two closed or active oil and gas wells within the Project boundary and six closed or active oil and gas wells within a 1 mile radius of the Project footprint (Appendix 19-A). If other unknown oil and gas wells are found during Project work, well closure would be negotiated with the owners. Project activities would not be a threat to properly closed oil and gas wells. If active wells are damaged during Project construction, impacts to local soil, surface water, and/or groundwater could occur from spills or leaks. However, oil and gas well destruction or closure would be conducted in accordance with DOGGR regulations (see Section 2.2.4).

Buried Asbestos Containing Material. Long term asbestos exposure can cause lung cancer and other respiratory problems. The Paramount Farming Company in Firebaugh, located on the northern border of the Project area, has 2.4 tons of buried asbestos containing waste material (SJRRP 2011). Failure to manage asbestos appropriately could adversely affect public health of construction workers and others.

When comparing Alternative A to existing conditions, impacts to construction workers and the public would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Therefore, impacts from decommissioning oil and gas wells would be less than significant, however failure to manage asbestos appropriately, if disturbed, could cause a **potentially significant** impact to Project workers and public health.

Mitigation Measure HAZ-3 (Alternative A): ***Minimize Disturbance to Known Hazardous Material Sites.*** Construction activities in the Project area will be modified to

minimize adverse effects to the public or the environment, including minimizing disturbance to known hazardous material sites. With implementation of the following measures, the potentially significant impacts can be reduced to **less-than-significant** levels.

Implementation Action: The location of the hazardous materials at the site will be identified and disturbance to this material will be avoided to the extent possible. If active oil and gas wells cannot be avoided, the destruction or closure of those wells will be conducted in accordance with the DOGGR regulations.

If asbestos containing material is located in an area that requires excavation, the following mitigation measures are required.

- All Federal, State and local permits to conduct this work will be obtained before the work is conducted.
- The contractor will develop an asbestos mitigation plan which will include dust control, ambient and personnel air monitoring, disposal, transportation planning, and reporting. The plan would be reviewed and approved by the San Joaquin Valley Air Pollution Control District. Upon approval of the mitigation plan, the plan will be implemented during construction activities.
- The contractor will use only asbestos trained personnel for the work.
- The asbestos containing material waste will be disposed of in only approved asbestos containing material disposal landfills.

Location: Project areas with active construction or used by construction personnel including access roads, staging and storage areas, and borrow sites that have abandoned oil and gas wells or asbestos containing material.

Effectiveness Criteria: Effectiveness will be based on compliance with regulatory guidelines.

Responsible Agency: Reclamation, CSLC, and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Ongoing over the construction timeframe.

Impact HAZ-4 (Alternative A): ***Creation of a Substantial Hazard from Mobilization of Soil Contaminants on the Floodplain.*** In contrast to the No-Action Alternative, Alternative A would allow inundation on an expanded floodplain such that flows would not be confined to the existing channel. There may be residual pesticide and herbicides in soil within the existing agricultural portion of the Project area from historical farming operations. Contaminates could include heavy metals such as arsenic, copper and zinc and chlorinated pesticides and herbicides.

Reclamation would require site cleanup prior to land acquisition if concentrated areas of contaminates are found during a Phase I Environmental Site Assessment; however, the type of remediation that would occur is not determined at this point. These soils would be sampled, analyzed, characterized for on-site use and/or off-site disposal options. High levels of pesticides and herbicides may exceed the hazardous waste criteria if the soil is moved. Lower levels of pesticides and herbicides may exceed aquatic toxicity criteria and may not be appropriate for use as borrow in berms or levees during Project construction. If soils are disposed of offsite, appropriate testing would occur to characterize the soil. Soil testing would also be required prior to selection of the final borrow areas and only soil with acceptable concentrations would be used for levee construction.

When comparing Alternative A to existing conditions, impacts to the public or the environment would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). Failure to identify and manage these soils can cause **potentially significant** impacts to surface water and groundwater.

Mitigation Measure HAZ-4 (Alternative A): ***Minimize Use of Pesticide and Herbicide Contaminated Soil.*** Construction activities in the Project area will be modified to minimize adverse effects to the public or the environment, including minimizing use of pesticide or herbicide contaminated soil. Implementation of this mitigation measure would reduce this impact to a **less-than-significant** level.

> **Implementation Action:** The contactor will collect samples in conformance with EPA SW-846 methodology and analyze the samples for heavy metals and chlorinated pesticides and herbicides. The analytical results will be evaluated against the Title 22 California hazardous waste criteria, the Regional Water Quality Control Board's Environmental Screening Levels, the EPA's Regional Screening Levels, or other regulatory and literature guidance documents for aquatic toxicity for reuse on the Project levees. Alternatively, aquatic testing may be conducted on representative soil samples for this purpose. (The aquatic toxicity evaluation for soil that will be exposed to the river is particularly important for the levee river side construction.)
>
> If the soil pesticide and herbicide conglomerate toxicity factors and/or toxicity testing shows unacceptable toxicity levels, that soil will not be used in the construction of Project levees or in other Project areas where the soil could come in direct contact with the San Joaquin River water.
>
> **Location:** Project areas with active construction or used by construction personnel including borrow sites.
>
> **Effectiveness Criteria:** Effectiveness will be based on compliance with testing and risk assessment guidelines.
>
> **Responsible Agency:** Reclamation, CSLC, and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Ongoing over the construction timeframe.

Impact HAZ-5 (Alternative A): ***Exposure of People to Increased Risk of Diseases.*** In contrast to the No-Action Alternative, Alternative A would involve construction and operation/maintenance activities in the area located along the San Joaquin River between the Chowchilla Bifurcation Structure and areas below Mendota Dam. These activities may increase the risk of exposure to disease vectors for construction workers, maintenance staff, and others. Prominent areas for WNV to occur include wetted portions of the San Joaquin River that provide mosquito habitat. Failure to prevent mosquito breeding areas can increase exposure to this vector. Potential exposure to Hantavirus could occur during demolition of existing structures or when maintaining enclosed, uninhabited structures. Failure to train and equip workers to prevent Hantavirus infections could cause construction workers to be exposed to this vector. Exposure to Valley Fever can occur during earth-moving activities, which release spores living in the soil. Failure to train workers and to use dust control measures to prevent Valley Fever infections could increase exposure to this vector.

When comparing Alternative A to existing conditions, impacts to construction workers, maintenance staff, and the public would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). This impact would be **potentially significant**.

Mitigation Measure HAZ-5A (Alternative A): ***Minimize Exposure to Potential West Nile Virus Carrying Vectors.*** Construction activities in the Project area will be modified to minimize adverse effects to the public or the environment, including minimizing exposure to potential WNV carrying vectors.

Implementation Action: The following mitigation measures will be used to minimize the opportunity of mosquito bites.

- Good housekeeping will be used on the Project site to reduce areas of ponding water (including standing water in buckets and cans) to prevent mosquitos from breeding in the ponded water and then transmitting the disease. For example, work areas will be inspected, uncovered, upright containers that could accumulate water will be eliminated, and potholes and other areas where water is likely to accumulate will be filled or drained.
- Workers will be alerted to use mosquito repellants, particularly early in the morning and in the evening hours.
- If mosquitos continue to be a problem with the Project personnel after implementing the above strategies, the issue will be discussed with the local mosquito abatement district(s) and additional controls such as spraying may be implemented.

Location: Project areas with active construction or used by construction personnel.

Effectiveness Criteria: Effectiveness will be based on evidence of mosquitos and complaints of mosquito bites.

Responsible Agency: Reclamation, CSLC, and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Ongoing over the construction timeframe.

Mitigation Measure HAZ-5B (Alternative A): ***Minimize Exposure to Potential Hantavirus Vectors.*** Construction activities in the Project area will be modified to minimize adverse effects to the public or the environment, including minimizing exposure to potential Hantavirus vectors.

Implementation Action: The following mitigation measures will minimize worker exposure to this disease.

- Educate workers on the virus, how it is transmitted, and safety precautions such as wearing masks around areas where rodents may have lived.
- Avoid stirring up dust in spaces where rodents may have lived.

Location: Project areas with active construction or used by construction personnel, particularly in enclosed buildings.

Effectiveness Criteria: Effectiveness will be based on implementation of construction training.

Responsible Agency: Reclamation, CSLC, and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Ongoing over the construction timeframe.

Mitigation Measure HAZ-5C (Alternative A): ***Minimize Exposure to Valley Fever.*** Construction activities in the Project area would be modified to minimize adverse effects to the public or the environment, including minimizing exposure to Valley Fever.

Implementation Action: The contractor will:

- Wet soil before and during earthwork to minimize visible dust generation.
- Limit vehicle speeds on uncontrolled, unpaved access/haul roads within the Project construction site.
- Use dust suppressants, as needed.

- Monitor for dust, and if dust levels exceed regulatory requirements, increase soil wetting and/or dust suppressant addition until the dust levels drop to acceptable levels.
- Use personal protective equipment to avoid breathing dust, if dust levels exceed regulatory requirements.

Location: Project areas with active construction or used by construction personnel.

Effectiveness Criteria: Effectiveness will be based on compliance with dust control measures.

Responsible Agency: Reclamation, CSLC, and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Ongoing over the construction timeframe.

With implementation of mitigation measures HAZ-5A through HAZ5-C, impacts from disease vectors can be reduced to **less-than-significant** levels.

Impact HAZ-6 (Alternative A): ***Creation of a Substantial Hazard from Decommissioned Wells.*** In contrast to the No-Action Alternative, Alternative A would result in the floodproofing or removal from service of drinking water wells and/or agricultural wells used for irrigation of crop land. Drinking water and agricultural supply wells within the Project footprint could provide conduits for surface water to contaminate local groundwater when taken out of service, if not properly closed. However, drinking water and agricultural wells taken out of service within the Project boundaries would be destroyed in compliance with California Department of Water Resources (DWR) (2013) and/or local regulations (see Section 2.2.4). These measures would be protective of groundwater quality.

The Project would also involve ground-disturbing activities in the Project area that could disrupt active, idle, or abandoned wells. Although Project proponents would survey construction sites for unknown idle and abandoned wells before initiating ground-disturbing activities (see Section 2.2.4), without appropriate protection, ground-disturbing activities in the Project area could disrupt these wells and create a substantial hazard to the public or the environment.

When comparing Alternative A to existing conditions, impacts to the public or the environment would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Impacts from idle and abandoned wells would be **potentially significant**.

Mitigation Measure HAZ-6 (Alternative A): ***Minimize the Disturbance of Idle or Abandoned Wells.*** Construction activities in the Project area will be modified to

minimize disturbance of idle or abandoned wells. Implementation of this mitigation measure would reduce the impact to a **less than significant** impact level.

> **Implementation Action:** Project proponents will survey all project sites for unknown idle and abandoned wells before initiating ground-disturbing activities. If the survey discovers an idle or abandoned well, ground-disturbing activities will not occur within 100 feet of the well, if feasible. If ground-disturbing activities need to occur within 100 feet of the abandoned well, Project proponents would either cover, fence, or otherwise clearly mark the well location and take measures to reduce hazards to workers and/or ensure that the well has been abandoned in accordance with State and local regulations, whichever is appropriate. Fresno County Department of Public Health, Environmental Health Division, or Madera County Department of Environmental Health will be notified, as appropriate.
>
> **Location:** Project areas with active construction or used by construction personnel, including borrow sites.
>
> **Effectiveness Criteria:** Effectiveness will be based on implementation of the pre-construction measures.
>
> **Responsible Agency:** Reclamation, CSLC, and the construction contractor.
>
> **Monitoring/Reporting Action:** Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.
>
> **Timing:** Ongoing over the construction timeframe.

Impact HAZ-7 (Alternative A): ***Increased Hazardous Emissions or Handling of Hazardous Materials, Substances, or Wastes within ¼ mile of a School.*** Local public schools are operated by Firebaugh Las Deltas School District and Mendota Unified School District (Table 19-3). These schools are located more than ¼ mile from the Project area. In contrast to the No-Action Alternative, Alternative A would include the use of hazardous materials in varying amounts during construction and Project operation/maintenance. Potential impacts from accidental release of hazardous materials used during the Project construction or operation/maintenance are unlikely to impact local schools. Hazardous materials transported to the Project area and used during construction or maintenance of the Project facilities would almost exclusively be diesel fuel used for earthmoving equipment. The diesel would typically be delivered to job sites via service trucks with trained personnel and spill kits on board to address any minor drips and leaks. No known acutely hazardous materials, with the possible exception of minor uses of acetylene/oxygen torches for demolition purposes, are likely to be used on during the Project construction. Because local schools are located more than ¼ mile from the Project area, the Project would have no impact to local schools.

Table 19-3.
Local Public Schools

Firebaugh Las Deltas Unified School District	Mendota Unified School District
Firebaugh High School 1976 Morris Kyle Dr., Firebaugh, CA	Mendota High School 1200 Belmont Avenue, Mendota, CA
Firebaugh Middle School 1600 16th Street, Firebaugh, CA	Mendota Continuation High School 211 Smooth Street, Mendota, CA
Hazel M. Baily Elementary School 1691 Q Street, Firebaugh, CA	McCabe Junior High School 250 South Derrick Street, Mendota, CA
A.F. Mills Intermediate 1191 P Street, Firebaugh, CA	McCabe Elementary School 250 South Derrick Street, Mendota, CA
Alternative Education 1666 Saipan Avenue, Firebaugh, CA	Washington Elementary School 1599 Fifth Street, Mendota, CA

Source: Firebaugh Las Deltas Unified School District 2013, Mendota Unified School District 2013

When comparing Alternative A to existing conditions, impacts to school safety would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to the No-Action Alternative). The Project would have **no impact** to local schools.

Impact HAZ-8 (Alternative A): ***Exposure of People or Structures to a Substantial Risk of Loss, Injury, or Death involving Wildland Fires.*** California's Central Valley natural grasslands and forested foothills are subject to wildfires. Therefore, the California Department of Forestry and Fire Protection (CAL FIRE) publishes, on its website, Fire Hazard Severity Zone Maps for all counties in California. The maps for Fresno and Madera counties that include the Project area show that the majority of the Project area is located in a Local Responsibility Area that is Unzoned with small area located in a Moderate Fire Hazard Severity Zone (CAL FIRE 2007a, 2007b).

The Project area is not located near any heavily wooded wildland areas. In addition, the riverine vegetation along the San Joaquin River is not typically very flammable. The Project area is located within a farming area, where crops are irrigated during the hot summer months which also reduces the plant flammability. Small localized brush fires are the most likely type of wildfire and can be easily contained by local fire departments. Local fire departments located in the vicinity of the Project area are described in Table 19-4. Incorporated Madera County fire protection is provided by the Madera County Fire Department. The department has 17 fire stations throughout the county to provide coverage.

Table 19-4.
Fire Stations in the Project Vicinity

Local Fire Stations	
Caruthers Station 90 2701 W. Tahoe Ave. Caruthers, CA 93609 559-864-3211	Mendota Station 96 101 McCabe Mendota, CA 93640 559-655-4107
Tranquillity Station 95 25101 Morton St. / P.O.Box 645 Tranquillity, CA 93668 559-698-5500	1575 11th Street, Firebaugh, CA 93622 559-659-2061

Source: Fresno County Fire Protection District 2012, Madera County Fire Department 2012.

When comparing Alternative A to existing conditions, impacts to the public or the environment would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). This impact would be **less than significant**.

Impact HAZ-9 (Alternative A): ***Creation of a Substantial Hazard in Areas Designated by Airport Land Use Plans, within 2 miles of an Airport, or in the Vicinity of a Private Airstrip.*** The only airport in the vicinity of the Project area is the William Robert Johnston Municipal Airport (Mendota Airport), located within ½ mile of the southwestern boundary of the Project area. The airport is a general aviation airport, open to the public. It is operated only in daylight hours and does not have fueling facilities. It does not have an operations tower and has no regularly scheduled commercial service (Federal Aviation Administration 2013).

In contrast to the No-Action Alternative, Alternative A would involve construction activities and improvements in the Project area. However, these construction activities and improvements would not have the potential to affect aircraft flight patterns or affect operations at the local airport. Specifically, implementation of the Alternative A would not involve construction at or near the airport, constructing tall structures or operating tall construction equipment (e.g., a crane) that could pose a hazard to airplanes. Dust control measures employed for other mitigation measures would prevent dust clouds from affecting air traffic. One threat to aircraft is bird strikes from birds the Project area. However, implementation of Alternative A would reduce the amount of ponding (on the San Joaquin River arm of Mendota Pool) that would attract birds that then could be an aircraft hazard. As a result, implementing Alternative A would not create a hazard to aircraft safety in the area. Based on these factors, the Project would have no impact on airport safety or local residents due to impacts to airport safety.

When comparing Alternative A to existing conditions, impacts to aircraft safety would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). The Project would have **no impact**.

Impact HAZ-10 (Alternative A): ***Impairment of the Implementation or Physical Interference with an Adopted Emergency Response or Emergency Evacuation Plan.*** The Madera County Sheriff is the Director of Disaster Services and Operational Area Coordinator and the Sheriff activates the County's Emergency Operations Center under prescribed conditions (Madera County OES 2010). The Fresno County OES is located in Fresno and each of the 15 unincorporated cities within the county maintains an OES function for its incorporated areas and coordinates with the County OES (Fresno County OES 2015).

The Project area is located in agricultural lands with very low population and structure density and does not encompass any major thoroughfares. The Project may increase emergency evacuation times in areas immediately north of the San Mateo Avenue crossing due to temporary closures for upgrades at the crossing. However, residences are not located to the north within the vicinity of the crossing, workers would be able to evacuate using alternative routes, and closure of the San Mateo Avenue crossing would be temporary to provide for upgrades. Therefore, conflicts with the local emergency response plans or plan implementation are not anticipated.

When comparing Alternative A to existing conditions, impacts to the public or the environment would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). The Project is not anticipated to impair local emergency response plans, so the Project poses **no impact** to these plans.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B would include construction of Project features including a Compact Bypass channel, a new levee system with a wide, consensus-based floodplain encompassing the river channel, and the Compact Bypass Bifurcation Structure with fish passage facility and fish screens. Other key features include construction of a fish passage facility at the San Joaquin River control structure at the Chowchilla Bifurcation Structure, the re-route of Drive 10 ½ (across the Compact Bypass control structure), and removal of the San Mateo Avenue crossing. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Impact HAZ-1 (Alternative B): ***Creation of a Substantial Hazard through the Routine Transport, Use, or Disposal of Hazardous Materials or through Reasonably Foreseeable Upset and Accident Conditions Involving the Release of Hazardous Materials.*** Refer to Impact HAZ-1 (Alternative A). Potential impacts of Alternative B would be similar to potential impacts of Alternative A. Because the Project would implement and comply with Federal, State, and local hazardous materials regulations monitored by the State and/or local jurisdictions, impacts related to creation of substantial hazards to the public through routine transport, use, disposal, and risk of upset would be unlikely with Project construction activities. There would be a **less than significant impact**.

Impact HAZ-2 (Alternative B): ***Increased Exposure to Hazardous Materials for People Residing or Working in the Project Area.*** Refer to Impact HAZ-2 (Alternative

A). Potential impacts of Alternative B would be similar to potential impacts of Alternative A. Implementing the Project alternative would have the potential to expose construction workers and others to hazardous materials. There would be a **potentially significant** impact.

Mitigation Measures HAZ-2A, HAZ-2B, HAZ-2C, HAZ-2D, and HAZ-2E (Alternative B): ***Follow General Hazardous Materials Guidelines, Properly Dispose of Hazardous Building Components, Properly Dispose of Pesticides, Properly Manage Discolored or Odiferous Soils, Properly Remove Underground Storage Tanks.*** Refer to Mitigation Measures HAZ-2A, HAZ-2B, HAZ-2C, HAZ-2D, and HAZ-2E (Alternative A). The same measures would be used here. Impacts would be **less than significant** with implementation of mitigation measures.

Impact HAZ-3 (Alternative B): ***Creation of a Substantial Hazard from Disturbance of Known Hazardous Material Sites.*** Refer to Impact HAZ-3 (Alternative A). Potential impacts of Alternative B would be similar to potential impacts of Alternative A. Project construction and other ground-disturbing activities could occur at a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, could create a hazard to the public or the environment. There would be a **potentially significant** impact.

Mitigation Measure HAZ-3 (Alternative B): ***Minimize Disturbance to Known Hazardous Material Sites.*** Refer to Mitigation Measure HAZ-3 (Alternative A). The same measure would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact HAZ-4 (Alternative B): ***Creation of a Substantial Hazard from Mobilization of Soil Contaminants on the Floodplain.*** Refer to Impact HAZ-4 (Alternative A). Potential impacts of Alternative B would be similar to potential impacts of Alternative A. There may be residual pesticide and herbicides in soil within the existing agricultural portion of the Project area from historical farming operations that could be mobilized due to Project operations. There would be a **potentially significant** impact.

Mitigation Measure HAZ-4 (Alternative B): ***Minimize Use of Pesticide and Herbicide Contaminated Soil.*** Refer to Mitigation Measure HAZ-4 (Alternative A). The same measure would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact HAZ-5 (Alternative B): ***Exposure of People to Increased Risk of Diseases.*** Refer to Impact HAZ-5 (Alternative A). Potential impacts of Alternative B would be similar to potential impacts of Alternative A. Project activities may increase the risk of exposure to disease vectors for construction workers. There would be a **potentially significant** impact.

Mitigation Measures HAZ-5A, HAZ-5B, and HAZ-5C (Alternative B): ***Minimize Exposure to Potential West Nile Virus Carrying Vectors, Minimize Exposure to Potential Hantavirus Vectors, and Minimize Exposure to Valley Fever.*** Refer to

Mitigation Measures HAZ-5A, HAZ-5B, and HAZ-5C (Alternative A). The same measures would be used here. Impacts would be **less than significant** with implementation of mitigation measures.

Impact HAZ-6 (Alternative B): ***Creation of a Substantial Hazard from Decommissioned Wells.*** Refer to Impact HAZ-6 (Alternative A). Potential impacts of Alternative B would be similar to potential impacts of Alternative A. Without appropriate protection ground-disturbing activities in the Project area could disrupt active, idle, or abandoned wells. This would be a **potentially significant** impact.

Mitigation Measure HAZ-6 (Alternative B): ***Minimize the Disturbance of Idle or Abandoned Wells.*** Refer to Mitigation Measure HAZ-6 (Alternative A). The same measures would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact HAZ-7 (Alternative B): ***Increased Hazardous Emissions or Handling of Hazardous Materials, Substances, or Wastes within ¼ mile of a School.*** Refer to Impact HAZ-7 (Alternative A). Potential impacts of Alternative B would be similar to potential impacts of Alternative A. Local public schools are located more than ¼ mile from the Project area and therefore potential releases of hazardous materials used during the Project construction are unlikely to impact local schools. There would be **no impact**.

Impact HAZ-8 (Alternative B): ***Exposure of People or Structures to a Substantial Risk of Loss, Injury, or Death involving Wildland Fires.*** Refer to Impact HAZ-8 (Alternative A). Potential impacts of Alternative B would be similar to potential impacts of Alternative A. Because the Project would implement reasonable wildland fire safety measures, the potential for construction activities to spark an uncontrollable wildland fire is considered remote. There would be a **less than significant** impact.

Impact HAZ-9 (Alternative B): ***Creation of a Substantial Hazard in Areas Designated by Airport Land Use Plans, within 2 miles of an Airport, or in the Vicinity of a Private Airstrip.*** Refer to Impact HAZ-9 (Alternative A). Potential impacts of Alternative B would be similar to potential impacts of Alternative A. Project construction activities would not have the potential to adversely affect aircraft flight patterns, operations at the local airport, or airport safety of local residents. There would be **no impact**.

Impact HAZ-10 (Alternative B): ***Impairment of the Implementation or Physical Interference with an Adopted Emergency Response or Emergency Evacuation Plan.*** Refer to Impact HAZ-10 (Alternative A). Potential impacts of Alternative B would be similar to potential impacts of Alternative A. The Project would not impair local emergency response plans. There would be **no impact**.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C would include construction of Project features including Fresno Slough Dam, a new levee system with a narrow floodplain encompassing the river channel, and the Short Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the Short Canal control structure and fish

screen, the Chowchilla Bifurcation Structure fish passage facility, modification of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Impact HAZ-1 (Alternative C): ***Creation of a Substantial Hazard through the Routine Transport, Use, or Disposal of Hazardous Materials or through Reasonably Foreseeable Upset and Accident Conditions Involving the Release of Hazardous Materials.*** Refer to Impact HAZ-1 (Alternative A). Potential impacts of Alternative C would be similar to potential impacts of Alternative A. Because the Project would implement and comply with Federal, State, and local hazardous materials regulations monitored by the State and/or local jurisdictions, impacts related to creation of substantial hazards to the public through routine transport, use, disposal, and risk of upset would be unlikely with Project construction activities. There would be a **less than significant** impact.

Impact HAZ-2 (Alternative C): ***Increased Exposure to Hazardous Materials for People Residing or Working in the Project Area.*** Refer to Impact HAZ-2 (Alternative A). Potential impacts of Alternative C would be similar to potential impacts of Alternative A. Implementing the Project alternative would have the potential to expose construction workers and others to hazardous materials. There would be a **potentially significant** impact.

Mitigation Measures HAZ-2A, HAZ-2B, HAZ-2C, HAZ-2D, and HAZ-2E (Alternative C): ***Follow General Hazardous Materials Guidelines, Properly Dispose of Hazardous Building Components, Properly Dispose of Pesticides, Properly Manage Discolored or Odiferous Soils, Properly Remove Underground Storage Tanks.*** Refer to Mitigation Measures HAZ-2A, HAZ-2B, HAZ-2C, HAZ-2D, and HAZ-2E (Alternative A). The same measures would be used here. Impacts would be **less than significant** with implementation of mitigation measures.

Impact HAZ-3 (Alternative C): ***Creation of a Substantial Hazard from Disturbance of Known Hazardous Material Sites.*** Refer to Impact HAZ-3 (Alternative A). Potential impacts of Alternative C would be similar to potential impacts of Alternative A. Project construction and other ground-disturbing activities could occur at a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, could create a hazard to the public or the environment. There would be a **potentially significant** impact.

Mitigation Measure HAZ-3 (Alternative C): ***Minimize Disturbance to Known Hazardous Material Sites.*** Refer to Mitigation Measure HAZ-3 (Alternative A). The same measure would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact HAZ-4 (Alternative C): ***Creation of a Substantial Hazard from Mobilization of Soil Contaminants on the Floodplain.*** Refer to Impact HAZ-4 (Alternative A). Potential impacts of Alternative C would be similar to potential impacts of Alternative A. There may be residual pesticide and herbicides in soil within the existing agricultural

portion of the Project area from historical farming operations that could be mobilized due to Project operations. There would be a **potentially significant** impact.

Mitigation Measure HAZ-4 (Alternative C): ***Minimize Use of Pesticide and Herbicide Contaminated Soil.*** Refer to Mitigation Measure HAZ-4 (Alternative A). The same measure would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact HAZ-5 (Alternative C): ***Exposure of People to Increased Risk of Diseases.*** Refer to Impact HAZ-5 (Alternative A). Potential impacts of Alternative C would be similar to potential impacts of Alternative A. Project activities may increase the risk of exposure to disease vectors for construction workers. There would be a **potentially significant** impact.

Mitigation Measures HAZ-5A, HAZ-5B, and HAZ-5C (Alternative C): ***Minimize Exposure to Potential West Nile Virus Carrying Vectors, Minimize Exposure to Potential Hantavirus Vectors, Minimize Exposure to Valley Fever.*** Refer to Mitigation Measures HAZ-5A, HAZ-5B, and HAZ-5C (Alternative A). The same measures would be used here. Impacts would be **less than significant** with implementation of mitigation measures.

Impact HAZ-6 (Alternative C): ***Creation of a Substantial Hazard from Decommissioned Wells.*** Refer to Impact HAZ-6 (Alternative A). Potential impacts of Alternative C would be similar to potential impacts of Alternative A. Without appropriate protection ground-disturbing activities in the Project area could disrupt active, idle, or abandoned wells. This would be a **potentially significant** impact.

Mitigation Measure HAZ-6 (Alternative C): ***Minimize the Disturbance of Idle or Abandoned Wells.*** Refer to Mitigation Measure HAZ-6 (Alternative A). The same measures would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact HAZ-7 (Alternative C): ***Increased Hazardous Emissions or Handling of Hazardous Materials, Substances, or Wastes within ¼ mile of a School.*** Refer to Impact HAZ-7 (Alternative A). Potential impacts of Alternative C would be similar to potential impacts of Alternative A. Local public schools are located more than ¼ mile from the Project area and therefore potential releases of hazardous materials used during the Project construction are unlikely to impact local schools. There would be **no impact**.

Impact HAZ-8 (Alternative C): ***Exposure of People or Structures to a Substantial Risk of Loss, Injury, or Death involving Wildland Fires.*** Refer to Impact HAZ-8 (Alternative A). Potential impacts of Alternative C would be similar to potential impacts of Alternative A. Because the Project would implement reasonable wildland fire safety measures, the potential for construction activities to spark an uncontrollable wildland fire is considered remote. There would be a **less than significant** impact.

Impact HAZ-9 (Alternative C): ***Creation of a Substantial Hazard in Areas Designated by Airport Land Use Plans, within 2 miles of an Airport, or in the Vicinity of a Private***

Airstrip. Refer to Impact HAZ-9 (Alternative A). Potential impacts of Alternative C would be similar to potential impacts of Alternative A. Project construction activities would not have the potential to adversely affect aircraft flight patterns, operations at the local airport, or airport safety of local residents. There would be **no impact**.

Impact HAZ-10 (Alternative C): ***Impairment of the Implementation or Physical Interference with an Adopted Emergency Response or Emergency Evacuation Plan.*** Refer to Impact HAZ-10 (Alternative A). Potential impacts of Alternative C would be similar to potential impacts of Alternative A. The Project would not impair local emergency response plans. There would be **no impact**.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D would include construction of Project features including Fresno Slough Dam, a new levee system with a wide floodplain encompassing the river channel, and the North Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the North Canal bifurcation structure with fish passage facility and fish screens, removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure, removal of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Impact HAZ-1 (Alternative D): ***Creation of a Substantial Hazard through the Routine Transport, Use, or Disposal of Hazardous Materials or through Reasonably Foreseeable Upset and Accident Conditions Involving the Release of Hazardous Materials.*** Refer to Impact HAZ-1 (Alternative A). Potential impacts of Alternative D would be similar to potential impacts of Alternative A. Because the Project would implement and comply with Federal, State, and local hazardous materials regulations monitored by the State and/or local jurisdictions, impacts related to creation of substantial hazards to the public through routine transport, use, disposal, and risk of upset would be unlikely with Project construction activities. There would be a **less than significant** impact.

Impact HAZ-2 (Alternative D): ***Increased Exposure to Hazardous Materials for People Residing or Working in the Project Area.*** Refer to Impact HAZ-2 (Alternative A). Potential impacts of Alternative D would be similar to potential impacts of Alternative A. Implementing the Project alternative would have the potential to expose construction workers and others to hazardous materials. There would be a **potentially significant** impact.

Mitigation Measures HAZ-2A, HAZ-2B, HAZ-2C, HAZ-2D, and HAZ-2E (Alternative D): ***Follow General Hazardous Materials Guidelines, Properly Dispose of Hazardous Building Components, Properly Dispose of Pesticides, Properly Manage Discolored or Odiferous Soils, Properly Remove Underground Storage Tanks.*** Refer to Mitigation Measures HAZ-2A, HAZ-2B, HAZ-2C, HAZ-2D, and HAZ-2E (Alternative A). The same measures would be used here. Impacts would be **less than significant** with implementation of mitigation measures.

Impact HAZ-3 (Alternative D): ***Creation of a Substantial Hazard from Disturbance of Known Hazardous Material Sites.*** Refer to Impact HAZ-3 (Alternative A). Potential impacts of Alternative D would be similar to potential impacts of Alternative A. Project construction and other ground-disturbing activities could occur at a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, could create a hazard to the public or the environment. There would be a **potentially significant** impact.

Mitigation Measure HAZ-3 (Alternative D): ***Minimize Disturbance to Known Hazardous Material Sites.*** Refer to Mitigation Measure HAZ-3 (Alternative A). The same measure would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact HAZ-4 (Alternative D): ***Creation of a Substantial Hazard from Mobilization of Soil Contaminants on the Floodplain.*** Refer to Impact HAZ-4 (Alternative A). Potential impacts of Alternative D would be similar to potential impacts of Alternative A. There may be residual pesticide and herbicides in soil within the existing agricultural portion of the Project area from historical farming operations that could be mobilized due to Project operations. There would be a **potentially significant** impact.

Mitigation Measure HAZ-4 (Alternative D): ***Minimize Use of Pesticide and Herbicide Contaminated Soil.*** Refer to Mitigation Measure HAZ-4 (Alternative A). The same measure would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact HAZ-5 (Alternative D): ***Exposure of People to Increased Risk of Diseases.*** Refer to Impact HAZ-5 (Alternative A). Potential impacts of Alternative D would be similar to potential impacts of Alternative A. Project activities may increase the risk of exposure to disease vectors for construction workers. There would be a **potentially significant** impact.

Mitigation Measures HAZ-5A, HAZ-5B, and HAZ-5C (Alternative D): ***Minimize Exposure to Potential West Nile Virus Carrying Vectors, Minimize Exposure to Potential Hantavirus Vectors, Minimize Exposure to Valley Fever.*** Refer to Mitigation Measures HAZ-5A, HAZ-5B, and HAZ-5C (Alternative A). The same measures would be used here. Impacts would be **less than significant** with implementation of mitigation measures.

Impact HAZ-6 (Alternative D): ***Creation of a Substantial Hazard from Decommissioned Wells.*** Refer to Impact HAZ-6 (Alternative A). Potential impacts of Alternative D would be similar to potential impacts of Alternative A. Without appropriate protection ground-disturbing activities in the Project area could disrupt active, idle, or abandoned wells. This would be a **potentially significant** impact.

Mitigation Measure HAZ-6 (Alternative D): ***Minimize the Disturbance of Idle or Abandoned Wells.*** Refer to Mitigation Measure HAZ-6 (Alternative A). The same

measures would be used here. Impacts would be **less than significant** with implementation of the mitigation measure.

Impact HAZ-7 (Alternative D): ***Increased Hazardous Emissions or Handling of Hazardous Materials, Substances, or Wastes within ¼ mile of a School.*** Refer to Impact HAZ-7 (Alternative A). Potential impacts of Alternative D would be similar to potential impacts of Alternative A. Local public schools are located more than ¼ mile from the Project area and therefore potential releases of hazardous materials used during the Project construction are unlikely to impact local schools. There would be **no impact**.

Impact HAZ-8 (Alternative D): ***Exposure of People or Structures to a Substantial Risk of Loss, Injury, or Death involving Wildland Fires.*** Refer to Impact HAZ-8 (Alternative A). Potential impacts of Alternative D would be similar to potential impacts of Alternative A. Because the Project would implement reasonable wildland fire safety measures, the potential for construction activities to spark an uncontrollable wildland fire is considered remote. There would be a **less than significant** impact.

Impact HAZ-9 (Alternative D): ***Creation of a Substantial Hazard in Areas Designated by Airport Land Use Plans, within 2 miles of an Airport, or in the Vicinity of a Private Airstrip.*** Refer to Impact HAZ-9 (Alternative A). Potential impacts of Alternative D would be similar to potential impacts of Alternative A. Project construction activities would not have the potential to adversely affect aircraft flight patterns, operations at the local airport, or airport safety of local residents. There would be **no impact**.

Impact HAZ-10 (Alternative D): ***Impairment of the Implementation or Physical Interference with an Adopted Emergency Response or Emergency Evacuation Plan.*** Refer to Impact HAZ-10 (Alternative A). Potential impacts of Alternative D would be similar to potential impacts of Alternative A, with the exception that the San Mateo Avenue crossing would be removed instead of modified. Although the Project could increase emergency evacuation times in areas immediately north of the San Mateo Avenue crossing, residences are not located to the north within the vicinity of the crossing and workers would be able to evacuate using alternative routes. The Project would not impair local emergency response plans. There would be **no impact**.

20.0 Recreation

This chapter evaluates the potential effects of the Project on recreation opportunities in the Project area. First, information is presented on existing recreation resources and activities known to occur in proximity to Reach 2B of the San Joaquin River. The overview of recreation resources presented in this section is based primarily on recreation information documented in the *San Joaquin River Recreation Study* (Blumenshine et al. 2012, California Department of Fish and Wildlife [DFW] 2013a).[1] Using this information as context, the analysis of recreation-related impacts of the Project is presented based on the characteristics of the Project alternatives, including the type, location, and duration of restoration activities.

20.1 Environmental Setting

Water from the San Joaquin River supports multiple uses, including recreation. Across the entire Restoration Area, recreation activity is diverse with people actively engaging in fishing, boating, environmental interpretation and education, trail use, camping, hunting, picnicking, and wildlife viewing/nature observation. However, the type and extent of recreation activity in Reach 2B are more limited because most of the property adjacent to the river is in private ownership and few public facilities exist. As a result, recreation opportunities are mainly water-oriented uses, primarily fishing. In addition, because the upstream portion of Reach 2B was typically dry prior to Interim Flows, except during high-flow events, recreation activity in the Project area is centered on the Mendota Pool area, which contains water on a year-round basis (except during dewatering periods) and is accessible by public roads and a local park. A comprehensive description of recreation uses, facilities, and public access located within the Project area is presented below.

20.1.1 Recreation Uses

The primary recreation activity in the Project area is fishing, although other activities occur including hunting, boating, and swimming, as well as general recreation and day use. Local residents use the Mendota Pool area for fishing, however, the number of anglers is low compared to fishing sites in Reach 1 (e.g., Lost Lake and Friant Cove), averaging only 1.2 anglers per site visit as compared to 6.7 anglers per site visit at Lost Lake in Reach 1. Non-angling recreation use is also low at Mendota Pool compared to activities in Reach 1, with about 0.25 non-angling recreationists found at Mendota Pool per site visit as compared to 61.7 non-angling recreationists per site visit at Skaggs Bridge Park (Blumenshine et al. 2012, DFW 2013a). The peak month for angling (and overall recreation) activity at Mendota Pool was October. Target species at Mendota Pool include warm-water game and non-game fisheries, including striped bass, catfish, largemouth bass, smallmouth bass, crappie and bluegill (Blumenshine et al. 2012).

[1] Mendota Pool was included in the sampling of lower river recreation sites during 2011/2012. A total of 75 site visits were made to the Mendota Pool during the sampling period.

Although fishing activity is known to occur at Mendota Pool, recreational fisheries have been constrained at this location due to approximate biennial winter dewatering, high water exchange rates, turbidity, poor recruitment, and lack of microhabitats (U.S. Department of the Interior, Bureau of Reclamation [Reclamation] 2007). Anglers at Mendota Dam are evenly distributed between fishing for consumptive purposes and catch and release (Blumenshine et al. 2012); however, the extent of subsistence fishing is unknown.

Fishing activity is concentrated just below Mendota Dam and above the dam in Mendota Pool, with anglers engaging in both shore-fishing along the riverbank and fishing directly from the dam. One popular shore-fishing and day-use site is a small dirt landing on the west bank of the river immediately downstream of Mendota Dam; this area is readily accessible from Bass Avenue and parking is available. It also serves as a boat launch for small watercraft (e.g., aluminum boats with motors) providing access to downstream stretches of the river. This hand launch is routinely used by DFW to facilitate boat patrols. Because this site is privately-owned by Central California Irrigation District, fishing and boat launching activity by the public are considered unauthorized uses. Fishing from Mendota Dam is also unauthorized, as access to the dam is restricted as evident by permanent barriers and "No Trespassing" signage restricting access. Further, DFW regulations prohibit fishing from any dam or any weir or rack which has a fishway or an egg-taking station (DFW 2013b); however, this regulation is not currently being enforced at Mendota Dam (Spada, pers. comm. 2011a). Shore fishing on Mendota Pool is also common, with access provided primarily by Mendota Pool Park. There is likely some fishing activity on private lands along Reach 2B, but site visits indicate the extent of fishing on private property at Mendota Pool is limited (Blumenshine et al. 2012).

Fishing activities also occur from boats in both the San Joaquin River and Fresno Slough arms of Mendota Pool. Small watercraft can enter the San Joaquin River arm of Mendota Pool at the San Mateo Avenue crossing, which is accessible by public roads. Fishing opportunities from boats available in the Fresno Slough arm of Mendota Pool can be accessed from the boat launch just south of Mowry Bridge.

Overall, fishing is the primary recreation activity in the Mendota Pool area for the local community, including residents of the city of Mendota, as demonstrated by the presence of anglers, particularly on weekends, during peak fishing seasons in the spring and fall. Fishing at Mendota Pool is consistent, occurring daily on a year-round basis (Blumenshine et al. 2012). A substantial proportion of anglers at Mendota Pool are from the community of Mendota (about 35 percent), and nearly all anglers are from Fresno County. In addition, many of the anglers appear to be experienced fisherman, averaging 26 fishing trips per year. Mendota Pool is one of the few locations with public fishing access in the Project area due to the extensive private land holdings in proximity to the river. When anglers at Mendota Pool were asked where they would fish if they could not fish in the San Joaquin River, the top two alternative sites were local irrigation canals and

the Kings River, both of which are outside the Project area (Blumenshine et al. 2012).[2] Fishing opportunities are also found elsewhere in the Project vicinity. Further upstream in Fresno Slough (outside the Project area, approximately 5 miles from Mendota Dam), a public campground and boat launch facility are located at the Highway 180 Bridge, which can be used to access the Project area (to the north) and the Mendota Wildlife Area (to the south). Downstream of the Project area, recreation and fishing opportunities on the San Joaquin River are available in the city of Firebaugh, approximately 8 miles south of Mendota Dam. The San Joaquin River borders about two-thirds of the town and access appears likely from several public roads. In addition, a community park (Dunkle Park) is located adjacent to the river. River-oriented recreation facilities, including a launch site for small watercraft, are also available just north of the 13th Street/Firebaugh Boulevard Bridge (American Whitewater Association 2012).

Hunting also occurs near the Project area within the San Joaquin River, primarily below Mendota Dam and within the Mendota Wildlife Area, which can be accessed via Fresno Slough. However, hunting in Reach 2B itself is limited. Downstream of Mendota Dam, hunting occurs from small boats, which typically access the river from the unpaved boat launch immediately downstream of Mendota Dam. Target species are generally waterfowl, such as ducks, and dove and quail. It is estimated that approximately 10 percent of the recreation use below Mendota Dam is hunting (Spada, pers. comm. 2011b).

Recreational boating is another activity occurring in the Project area. Flat-water boating opportunities are available on Mendota Pool. Boat access to Mendota Pool is provided at informal locations along the river, mainly on private land, as well as a paved boat launch just north of Mendota Pool Park that provides direct access to the Fresno Slough arm of Mendota Pool. In addition, unmotorized watercraft, such as kayaks and canoes, have been observed accessing the San Joaquin River downstream of Mendota Dam using the unpaved boat launch downstream of Mendota Dam as a put-in location.

People also visit the Mendota Pool area for general recreation and day use, including swimming during the summer season. Swimming activity is concentrated in Mendota Pool; swimming is limited downstream of the dam during periods of high flows.

20.1.2 Recreation Facilities and Areas

Developed recreation facilities and access points are limited in the Project area; however, there are several recreational facilities and areas that support the recreation activities described above.

Mendota Pool Park is the only public recreation facility in the Project area and serves local people. The land underlying the park is owned by Central California Irrigation District, but is leased and managed by the city of Mendota. The 85-acre park provides

[2] A total of 65 people responded to the question on alternative fishing sites to Mendota Pool. The responses are as follows: "The Canals" (9 responses), Kings River (8), California Aqueduct (3), Hume Lake (3), Imperial Valley (3), Kern County (2), Lodi Delta (2), Ocean (2), Pine Flat Lake (2), Salt Slough (2), Avocado Lake (1), DK (1), Hensley Lake (1), Los Banos (1), Regional Sports Center (1), and San Luis Reservoir (1)

picnic tables, playground, ballfield, performance stage, and open space. The park is located adjacent to and provides direct access to the Fresno Slough arm of Mendota Pool. Access from the park to Mendota Pool is available at both the southeast and northeast corners of the park. Informal paths lead directly to the shoreline where trash receptacles and picnic tables are provided. There are no official boat launch facilities within the park; however unregulated self-launching from the shoreline could occur.

Boat access to the Project area is facilitated by several boat launches located near the Mendota Pool area. A developed (paved) boat launch is located off the gravel road leading to Mowry Bridge just north of Mendota Pool Park and the Delta-Mendota Canal (DMC). This facility primarily provides access to Fresno Slough south of Mowry Bridge because the bridge can serve as a barrier to downstream access depending on size of watercraft and water levels. However, low-profile watercraft can navigate under the bridge and access the Mendota Dam area and the San Joaquin River arm of Mendota Pool. This boat launch was constructed and is operated by the city of Mendota. In addition, as described above, there is an undeveloped, user-defined hand launch below Mendota Dam providing access to Reach 3 of the San Joaquin River, which can be used for canoes and kayaks.

The Mendota Wildlife Area is located several miles south of the Project area along Fresno Slough. This area consists of nearly 12,000 acres of managed impoundments and wetland and upland habitat, providing opportunities for waterfowl hunting, fishing, camping, bird watching, and other activities.

20.1.3 Public Access

Land along Reach 2B of the San Joaquin River is predominantly in private ownership and used for agricultural production; therefore, is not publicly accessible. As a result, authorized public access is limited to Mendota Pool Park and the areas immediately downstream and upstream of Mendota Dam. Public access to Mendota Dam itself is restricted.

Another access point for recreation is the San Mateo Avenue crossing, located at the upstream end of the San Joaquin River arm of Mendota Pool. The public can access the river from the north via Chowchilla Canal Road, a public roadway. This location provides approximately 7 miles of downstream river access year-round and upstream river access at certain times of the year when flows are present. In addition to general recreation activities, anglers use this location to launch boats; and it is also a put-in location for other non-motorized watercraft.

Informal access points are also found along the bank of the San Joaquin River. Because the riverbank is predominantly in private ownership, authorized access at these locations is primarily for local landowners and/or their guests. However, the public commonly accesses the river from private lands along the river, which is considered trespassing.

20.2 Regulatory Setting

There are no established management plans for the Mendota Pool area or any specific guidelines for recreation management applicable to the Project area. There are, however, regulations pertaining to fishing and hunting that are enforced at the State level by DFW. In addition, there are general policies related to recreation found in the local city and county general plans.

20.2.1 Federal

Federal Water Project Recreation Act of 1965, Public Law 89-72

The Federal Water Project Recreation Act requires that Federal navigation, flood control, reclamation, hydroelectric, or multipurpose water resource projects consider opportunities for outdoor recreation and for fish and wildlife enhancement. Since the passage of Public Law 89-72, recreational development is considered for Reclamation projects. However, if a project does not have specific recreation authority, Public Law 89-72 authorizes Reclamation to cost share for development of public recreation and wildlife facilities when a non-federal partner indicates through long-term agreement their willingness and ability to share in the costs of recreation development and to operate and maintain those recreation facilities after construction. Without a recreation partner agreeing to assist in the development and long-term management of these facilities, Reclamation is limited to providing only "limited basic" recreation facilities to protect the health and safety of the general public.

20.2.2 State of California

Freshwater Sport Fishing Regulations, California Code of Regulations Title 14

DFW maintains and enforces statewide fishing and hunting regulations. Currently, from the Friant Dam to the Highway 140 bridge and from the Highway 140 bridge downstream to the Interstate 5 bridge at Mossdale, fishing in the San Joaquin River is open year round; however, this stretch of the river is closed to salmonid fishing with the exception of hatchery trout and hatchery steelhead. In addition, DFW fishing regulations state that fishing is not allowed within 250 feet of: (a) any fishway or any egg-taking station; (b) any dam or any weir or rack which has a fishway or an egg-taking station; or (c) the upstream side of any fish screen (DFW 2013b). DFW patrols the Mendota Pool area on a routine basis.

Public Trust Lands

The California State Lands Commission (CSLC) has mapped State lands and public trust lands in Reach 2B. In or about April 2008, Reclamation requested the technical and specialized assistance of CSLC staff to help identify all sovereign and public trust lands under the jurisdiction of the CSLC, in connection with the San Joaquin River Restoration Program (SJRRP). There is no other State or Federal agency, or private entity, with the historical records, mapping, expertise and experience to satisfy Reclamation's request for technical assistance. CSLC's San Joaquin River Administrative Maps will facilitate the construction of the channel modifications and improvements needed for the SJRRP. The CSLC, at its regular public meeting on August 14, 2012, by approval of Calendar/Minute

Item No. 53, authorized CSLC staff to file the Record of Survey for the San Joaquin River Administrative Map for Reach 2B (CSLC 2011). These maps depict the location and extent of sovereign land title interest claims of the State in and to the bed of the San Joaquin River within Reach 2B and indicate the following: "Except where the original grant under which the adjoining land is held indicates a different intent, the State asserts fee ownership between the low water lines as shown, and a public trust easement over the lands between the high and low water lines pursuant to Civil Code Section 830, as interpreted in *People v. Superior Court (Lyon)*, 29 Cal. 3d 210 (1981), and in *People v. Superior Court (Fogerty)*, 29 Cal. 3d 240 (1981)" (CSLC 2011). See Chapter 16, "Land Use Planning and Agricultural Resources" for a description of the public trust easement. To access the easement, legal access is required; the public is not entitled to cross private lands to use the public trust easement area.

20.2.3 Regional and Local

The local general plans of Fresno and Madera counties provide policy direction related to recreation in the Project vicinity; however, most of the policies are specific to areas outside the Project area.

The Fresno County General Plan (Fresno County 2000) includes sections on parks and recreation and on recreational trails. These sections focus on designating land for recreation and promoting the development of recreational facilities and a trail system. General plan policies applicable to this Project include policies encouraging agencies providing recreational facilities to maintain and improve, if possible, their current levels of service (Policy OS-H.5).

The Madera County General Plan (Madera County 1995) identifies goals and policies related to public recreation and parks, private recreational facilities and opportunities, and recreational trails. General plan policies applicable to this Project include policies encouraging agencies providing recreation facilities to maintain and improve, if possible, their current levels of service (Policy 4.A.7).

The nearest municipality to the Project area is the city of Mendota. The city of Mendota General Plan (City of Mendota 2009) references the Mendota Pool Park and boat launch, but notes that these facilities are located in unincorporated Fresno County outside the City's planning area. Therefore, the city of Mendota does not administer any plans or policies related to recreation in the Project area. The city of Firebaugh is located outside the Project area, approximately 8 miles from Mendota Pool Park.

20.3 Environmental Consequences and Mitigation Measures

20.3.1 Impact Assessment Methodology

This section describes the approach for the analysis of recreation resources in the Project area. The evaluation of impacts on recreation considers the extent to which existing public access and recreation activities are currently available in the Project area, including opportunities for fishing, hunting, boating, and general recreation at Mendota Pool, Mendota Pool Park, and downstream of the Pool to the point where the Mendota

Pool Bypass connects to the San Joaquin River (in Reach 3). Recreational use information is based primarily on the results of the *San Joaquin River Recreation Study* (Blumenshine et al. 2012).

The characteristics of Project construction, including the extent and duration of construction activities, have been reviewed to determine whether the Project would physically affect existing recreational features and access points and/or diminish the quality of recreation opportunities due to construction-related externalities (i.e., noise and dust). Most of the construction-related effects at sites within the Project area would occur during active construction, i.e., occurring intermittently over the 11- to 13-year construction period (depending on alternative) as identified in Section 2. There would be limitations on public access to existing recreation use areas in proximity to construction activity, which would occur primarily during daylight hours on weekdays. Under all of the Project alternatives, the use of borrow material would be required during construction and would come from nearby land in the Project area (located within the larger areas identified in Figure 1-2 as potential borrow areas). Potential borrow areas are primarily on private land and would not affect recreation uses in the Project area.

The long-term effects on recreation are considered in context of Restoration Flows and fish passage improvements and the related effects on recreational angling, general water recreation, and public access in Reach 2B (including Mendota Pool) and the upper portion of Reach 3 below the Pool. The analysis also considers the direct effects on recreation downstream of Mendota Dam at the point where the proposed bypass facility would enter in the river. The evaluation is based on comparisons to existing conditions[3] as well as to the No-Action condition, which includes Restoration Flows.

Potential effects further downstream from changes in river flows are incorporated by reference from the Program Environmental Impact Statement/Report (PEIS/R), which indicates that boating activity is likely to increase in Reaches 3, 4, and 5 due to increased flows (SJRRP 2011, page 21-51).

20.3.2 Significance Criteria

The Project is evaluated in accordance with the recreation section of Appendix G of the California Environmental Quality Act (CEQA) Environmental Checklist and professional judgment on anticipated impacts on existing recreation resources. Under National Environmental Policy Act (NEPA) Council on Environmental Quality Regulations, effects are evaluated in terms of their context and intensity. These factors have been considered when applying the State CEQA Guidelines, Appendix G. The Project would result in a significant impact on recreation if it would do any of the following:

[3] Existing conditions are defined as the conditions existing when the Notice of Intent and Notice of Preparation were filed, which was July 2009 for this Project and prior to Interim Flows. However, in certain cases, field data were collected at a later date. Often, this means that the data were collected after the start of Interim Flows. Therefore, in some cases, the existing conditions described will include the conditions after the start of Interim Flows.

- Have a substantial adverse effect, either directly or indirectly, through modifications to the recreation setting, or the availability or quality of recreational facilities, services, or recreational opportunities.
- Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.
- Develop new recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

20.3.3 Impacts and Mitigation Measures

This section provides an evaluation of direct and indirect effects of the Project Alternatives on recreation resources. It includes analyses of potential effects relative to No-Action conditions in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. The analysis is organized by Project alternative with specific impact topics numbered sequentially under each alternative. With respect to recreation, the environmental impact issues and concerns are:

1. Construction-Related Effects on Recreation Opportunities and Facilities.
2. Permanent Displacement of Existing Recreation Uses and Access Restrictions from Project Facilities.
3. Effects on Recreational Angling at Project Structures.
4. Effects of Aquatic Habitat Improvements on Recreational Angling.
5. Effects of Increased Flows on Recreation Opportunities and Facilities.
6. Conflicts with Recreation Goals and Policies.

Other recreation-related issues covered in the PEIS/R are not covered here because they are programmatic in nature and/or are not relevant to the Project area. These include recreation effects at Millerton Lake (outside the Project area) and wildlife-based recreation effects in downstream reaches (not applicable to the Project area).

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other Program actions would be implemented, including habitat restoration in other reaches, augmentation of river flows, and reintroduction of salmon. Without the Project, these activities would not achieve the Settlement goals. The analysis is a comparison to existing conditions, and no mitigation is required for No-Action.

Impact REC-1 (No-Action Alternative): *Construction-Related Effects on Recreation Opportunities and Facilities*. Under the No-Action Alternative, the Project would not be implemented and there would be no associated construction activities in the Project area. In addition, there would be no additional construction workers in the Project area that may increase the demand for local recreation opportunities. As a result, there would be **no impact** on existing recreation opportunities or facilities.

Impact REC-2 (No-Action Alternative): ***Permanent Displacement of Existing Recreation Uses and Access Restrictions from Project Facilities.*** Under the No-Action Alternative, the public would continue to be able to access the Fresno Slough arm of Mendota Pool at the city of Mendota boat launch, access Reach 3 of the San Joaquin River at the informal hand launch below Mendota Dam, and access the San Joaquin arm of Mendota Pool at San Mateo Avenue. In addition, none of the proposed facilities that are part of the Project would be developed. Shore fishing opportunities and boating access would not be restricted by new Project facilities. Therefore, there would be no displacement of existing recreation opportunities or access restrictions in the Project area from Project structures. As a result, there would be **no impact** on recreation opportunities as compared to existing conditions.

Impact REC-3 (No-Action Alternative): ***Effects on Recreational Angling at Project Structures.*** While the No-Action Alternative does not include the Project, Program-wide restoration activities would still be implemented, including reintroduction of salmon in the San Joaquin River. Consequently, fishing regulations designed to protect salmon populations would likely be enforced throughout the Program's Restoration Area, including seasonal and geographic fishing closures and restrictions on specific fish species. These regulations would not affect the majority of the existing recreational angling in the Project area because Reach 2B is mainly a warm-water recreational fishery (i.e., few steelhead or trout) and salmon fishing is already prohibited under existing conditions. However, existing regulations designed to protect salmon populations would likely be enforced in areas that have not historically had salmon. In the context of Reach 2B, this means that provisions that restrict fishing within 250 feet of a fish ladder, dam or barrier (as outlined in Section 2.35 of the California Freshwater Sport Fishing Regulations; see Section 20.2.2) would likely be enforced at Mendota Dam. The enforcement of this regulation at Mendota Dam would displace anglers that currently fish from or below the dam, a popular fishing site for locals in the Mendota area. (Existing fishing activity at Mendota Dam is considered unauthorized because it occurs on private land, as well as violating Section 2.35 of the California Freshwater Sport Fishing Regulations.) Seasonal and geographic fishing closures may also occur under the No-Action Alternative. This could displace anglers in a portion of the Project area.

In response to the displacement of anglers from Mendota Dam, the demand for recreational fishing opportunities would likely be redirected to other nearby fishing sites in the Project area or vicinity, although fishing opportunities outside of the Project area and in proximity to the Mendota area are relatively limited. It is expected that anglers would seek fishing opportunities in other parts of the San Joaquin River, such as in the Firebaugh area, at Mendota Pool Park or other areas of Mendota Pool (primarily warm-water species), at local irrigation canals including the DMC, and/or at the Kings River and other locations outside the Project area (see Section 20.1.1). However, based on the number of anglers affected (relatively small number compared to other reaches of the San Joaquin River), it is unlikely that displaced fishing activity would cause deterioration of existing facilities at these alternative sites.

Compared to existing conditions, the No-Action Alternative would have an adverse effect on recreational angling within the Project area (primarily at Mendota Dam). However,

because existing recreational angling at Mendota Dam is unauthorized and other fishing sites are available, which would not deteriorate from displacement of angling activities, these impacts are considered **less than significant**.

Impact REC-4 (No-Action Alternative): ***Effects of Aquatic Habitat Improvements on Recreational Angling.*** Under the No-Action Alternative, Program-level actions would still be implemented across the Program's Restoration Area, including reintroduction of salmon into the San Joaquin River. In conjunction with salmon reintroduction, riverine habitat would be improved as a result of restoration activities in other reaches and increased flows, which would generally improve the health of the aquatic ecosystem and benefit cold-water fish species, causing a change in species composition from a predominately warm-water fishery to include more cold-water fish.

Prior to Interim and Restoration flows, the portion of Reach 2B upstream of the San Mateo Avenue crossing was typically dry. With implementation of these flows, aquatic habitat in Reach 2B above Mendota Pool has improved and is used by fish recruited from Mendota Pool or from upper reaches (see Chapter 5.0, "Biological Resources – Fisheries"). Increasing the range of aquatic habitat benefits fish, including recreational fisheries found in the San Joaquin River. This includes warm-water species, such as crappie, blue-gill, largemouth and smallmouth bass and catfish, and cold-water species, such as striper and steelhead, that are found in the Project area. Accordingly, these Program-level actions are expected to improve the quality of recreational fishing in Reach 2B above Mendota Pool, although salmon harvest would continue to be prohibited. Compared to existing conditions, a **beneficial** effect on recreational fishing is expected.

Impact REC-5 (No-Action Alternative): ***Effects of Increased Flows on Recreation Opportunities and Facilities.*** As described in REC-4, Reach 2 B would receive Restoration Flows up to the current capacity of the reach under the No-Action Alternative. In addition to benefits attributed to recreational fisheries above Mendota Pool, increased flows also have the potential to improve recreation conditions throughout the Program's Restoration Area, including Reach 2B, particularly for boating and other water-dependent activities. Specifically, increased river flows would provide more opportunities for motorized and non-motorized watercraft (e.g., kayaking and canoeing) to access the San Joaquin River because water would typically remain in the river year round rather than going dry at certain times of the year as is the case prior to Interim Flows. Similarly, there would be more opportunities for swimming. In the context of the Project area, these additional recreational opportunities would extend from the Chowchilla Bifurcation Structure to Mendota Dam and into Reach 3 (below Mendota Dam). Compared to existing conditions, the No-Action Alternative would have a **beneficial** effect on recreation associated with increased flows on the San Joaquin River.

Impact REC-6 (No-Action Alternative): ***Conflicts with Recreation Goals and Policies***. Under the No-Action Alternative, as described above, recreation conditions in the Project area would be enhanced (e.g., improvements to recreational fisheries and boating opportunities), while at the same time, fishing activity may be displaced due to enforcement of existing and future fishing regulations. Both the Fresno County General Plan and Madera County General Plans, call for encouraging agencies providing

recreational facilities to maintain and improve, if possible, their current levels of service (see Fresno County General Plan Policy OS-H.5 and Madera County General Plan Policy 4.A.7). The No-Action Alternative may conflict with these goals and policies due to displacement of fishing activity at Mendota Dam. However, fishing at Mendota Dam is unauthorized and the general plans designate the land in the Project area for agricultural uses and do not specifically provide for recreation management at Mendota Dam. Therefore, compared to existing conditions, potential conflicts with recreation-related goals and policies of locally-adopted plans would be **less than significant**.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would entail construction of new Project facilities, including a levee system encompassing the existing river channel and the proposed bypass channel around Mendota Dam. Other key features include construction of a fish barrier below Mendota Dam, the Mendota Pool Dike (separating the San Joaquin River and Mendota Pool), the South Canal, South Canal bifurcation structure, and removal of the San Joaquin River control structure of the Chowchilla Bifurcation Structure. No construction activities would occur at or near Mendota Dam, which falls outside the Project boundary under Alternative A. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Impact REC-1 (Alternative A): *Construction-Related Effects on Recreation Opportunities and Facilities*. Compared to No-Action, Project construction has the potential to result in short-term displacement of existing recreation uses near construction activities due to access restrictions near construction areas (e.g., construction fencing). Construction of facilities or other Project features in or near the river are likely to take place in the dry season when Restoration Flows are low, which could conflict with some water-dependent recreation activities (e.g., swimming, boating, and fishing) occurring in the Project area during summer months. Construction of off-river facilities is not seasonally dependent.

Construction-related restrictions along the proposed Compact Bypass and South Canal would primarily affect private lands where public access and recreation activity is already limited. Recreation activities that could be affected include shoreline fishing by private property owners and/or other individuals trespassing on private property to fish near the proposed bypass channel. In these cases, people engaging in recreation activities would likely relocate to other nearby areas along the river that are not otherwise restricted by Project construction.

Recreation opportunities outside construction zones would remain available to the public, such as general recreation at Mendota Pool Park and water-oriented activities (e.g., swimming) near Mendota Dam. However, Alternative A may diminish the quality of these local recreation opportunities due to construction-related externalities, such as noise and dust, which would be generated on a periodic or limited basis over the 132-month construction period.

When comparing Alternative A to existing conditions, impacts to recreation would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative

A to the No-Action Alternative). Because construction-related impacts would occur over an extended (multi-year) timeframe, which may include periods of peak recreation use, these impacts are considered **potentially significant**.

Mitigation Measure REC-1 (Alternative A): ***Minimize Construction Effects on Recreation Uses.*** Construction activities in the Project area will be modified to minimize adverse effects on recreation uses, including the following provisions: (1) allow access to recreation use areas when active construction is not occurring, and (2) configure construction zones to minimize access restrictions to recreation use areas. The proposed construction modifications would provide comparable access to recreation use areas as under existing conditions when active construction is not occurring (subject to public safety constraints). The impact would be **less than significant** after mitigation.

> **Implementation Action:** Allow access to recreation use areas at Mendota Pool and below Mendota Dam when active construction is not occurring, and configure construction zones to minimize access restrictions to these and other recreation use areas (e.g., San Mateo Avenue crossing) during periods when active construction is not occurring.
>
> **Location:** The location of proposed construction area security modifications will vary as construction activities move throughout the Project area but would be focused primarily at Mendota Pool.
>
> **Effectiveness Criteria:** Effectiveness will be based on public complaints to the SJRRP.
>
> **Responsible Agency:** Reclamation and CSLC.
>
> **Monitoring/Reporting Action:** Adequacy of the proposed construction practices will be confirmed with Reclamation managers and CSLC monitors.
>
> **Timing:** Mitigation will be ongoing over the construction timeframe.

Impact REC-2 (Alternative A): ***Permanent Displacement of Existing Recreation Uses and Access Restrictions from Project Facilities.*** Compared to No-Action, Alternative A would result in permanent displacement of recreation opportunities in the Project area due to Project design features that restrict public access as described below.

One of the most prominent effects on recreation would be associated with the fish barrier facility below Mendota Dam. The fish barrier facility would restrict the public from launching watercraft at the informal hand launch just below Mendota Dam and floating downstream (beyond the fish barrier) to engage in recreation activities. This would eliminate opportunities to access Reach 3 from the Mendota Dam area for fishing, hunting, and boating (including kayaking and canoeing) without portaging around the barrier, which could result in trespassing on private property at new locations. Further, the fish barrier would also limit the quantity of fish just below Mendota Dam, as salmon and other large fish would be directed up the bypass channel. There is the potential that some smaller fish species could make it past the fish barrier, which could support fishing

opportunities between Mendota Dam and the barrier, but the quantity of fish would be limited relative to No-Action conditions. (Restrictions on fishing opportunities associated with enforcement of existing fishing regulations near fish passage facilities, fish screens, fish barriers, and dams are addressed in REC-3 below.)

Alternative A would also result in additional access restrictions from Mendota Pool to the San Joaquin River upstream of the proposed Mendota Pool Dike. This facility would restrict boating access in Reach 2B, thereby adversely affecting fishing and kayaking/canoeing opportunities upstream of Mendota Dam, particularly for people accessing the river at the city of Mendota boat launch and traversing under Mowry Bridge.[4] People using this public boat launch would be limited to recreation opportunities in Mendota Pool (below the dike) and Fresno Slough, the latter providing access to the Mendota Wildlife Area.

Alternative A includes the grade control structures in the Compact Bypass channel, which would restrict recreational boating between Reach 2B and Reach 3 of the San Joaquin River during periods of low river flows. Currently, Mendota Dam serves as a similar barrier,[5] so there would be minimal change compared to No-Action.

The addition of the South Canal bifurcation structure would represent a barrier to boating access. Adverse recreation effects associated with the proposed South Canal bifurcation structure would be minor because the existing San Joaquin River control structure of the Chowchilla Bifurcation Structure already represents a barrier to boating access under existing conditions, and the South Canal bifurcation structure would be added while the San Joaquin River Control Structure would be removed.

Public road access to Mendota Dam and Pool from Drive 10 ½ would be permanently restricted under Alternative A as Drive 10 ½ would terminate at the east side of the Compact Bypass channel, thereby limiting fishing access. However, public access to these facilities would remain available from the west side of the Project area.

Lastly, there would be minimal, if any, change to public access at the San Mateo Avenue crossing of the river, which would be upgraded under this alternative.

In response to these access restrictions, people that typically visit specific sites in the Project area (e.g., Mendota Dam) may elect to recreate elsewhere in the Project area or vicinity to meet their outdoor recreation demands or they may forego outdoor recreation opportunities for other forms of recreation. Alternative locations for fishing and boating exist within the Project area (e.g., the Fresno Slough arm of Mendota Pool) and outside the Project area. Because many of the people recreating in the Reach 2B area are local residents, it is likely that they would seek recreation opportunities in the local area, but may visit other sites in the region. Other fishing sites mainly consist of nearby irrigation canals, including the DMC, and other parts of the San Joaquin River, such as the

[4] Mowry Bridge is a barrier to boating access for large watercraft, but not for kayaks and canoes.

[5] Although there is a hand launch on the downstream side of Mendota Dam there are no portage facilities on the upstream side of the dam. Due to relatively steep slopes on the west bank, entering or exiting the river upstream of the dam would be difficult without trespassing on private property.

Firebaugh area. However, the quality of fishing may be inferior compared to the Mendota Dam area, which represents a prime location for certain species, such as striper and catfish. People wanting to fish and hunt (from boats) in Reach 3 may try to access the river below the proposed fish barrier, but most of the land along this stretch of the river is privately owned and informal access may constitute trespassing. The anticipated level of recreation pressure at these alternative locations is not expected to result in deterioration of existing recreation facilities and adverse physical effects on the environment.

When comparing Alternative A to existing conditions, impacts to local recreation would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to the No-Action Alternative). Although other recreation opportunities for fishing, boating, and hunting exist in the vicinity of the Project area, the proposed fish barrier below Mendota Dam would impact boating access between Reach 3 and Reach 2B below Mendota Dam and constrain regional boating recreationists' ability to link to the other reaches of the river. Also, the Mendota Pool Dike introduces an access constraint upstream of the dam, and the South Canal bifurcation structure introduces an access constraint once the San Joaquin River control structure of the Chowchilla Bifurcation Structure is removed. The loss of boating access would be a **potentially significant** impact.

Mitigation Measure REC-2 (Alternative A): ***Establish Boat Portage Facilities Around Project Facilities.*** Portage facilities for small watercraft will allow for boating access around Project structures (e.g., the fish barrier) and facilitate connectivity to downstream areas in Reach 3. Another portage facilities will be added at the Mendota Pool Dike and at the new South Canal bifurcation structure. The new portage facilities will incorporate signs to direct boaters around the fish barrier, the dam, the dike, and the South Canal bifurcation structure (and associated fish passage facilities and fish screens), showing them how to connect with the river safely while minimizing impacts to adjacent private lands at each location. The portage improvements would provide comparable access to recreation use of the river equivalent to the "ease of use" associated with the existing hand launch facility, subject to public safety constraints. The impact to boating access would be **less than significant** after mitigation.

Implementation Action: Design boat portage into the bank improvements at Project structures. Allow continued boating access to recreation use areas at Mendota Pool and below Mendota Dam.

Location: The location of the new portage facilities will be at Project structures.

Effectiveness Criteria: Effectiveness will be based on public complaints to the SJRRP.

Responsible Agency: Reclamation and CSLC.

Monitoring/Reporting Action: Adequacy of the proposed portage facilities will be confirmed with Reclamation managers and CSLC monitors.

Timing: Mitigation will be completed at the time of structure installations.

Impact REC-3 (Alternative A): ***Effects on Recreational Angling at Project Structures.*** Under all the Project alternatives, potential effects of fishing regulations on recreational angling at existing Project structures would be similar to the No-Action Alternative because regulations would be enforced irrespective of Project implementation in Reach 2B, including restrictions on fishing at Mendota Dam. The fishing regulations enforcement would not affect the majority of recreational angling in Reach 2B because Mendota Pool is mainly a warm-water recreational fishery and salmon fishing is already prohibited under existing conditions. However, enforcement of existing fishing regulations, namely Section 2.35 of the California Freshwater Sport Fishing Regulations (see Section 20.2.2), would result in displacement of anglers from Mendota Dam, thereby redirecting recreational fishing demand to other nearby fishing sites in the Project area and vicinity. Refer to Impact REC-3 (No-Action Alternative) for more information.

In addition, fishing regulations would likely be enforced at new projects facilities that provide fish passage, including the proposed Compact Bypass and the South Canal bifurcation structure. As a result, Alternative A would restrict fishing opportunities in proximity to these Project features, thereby affecting additional stretches of the river that are not currently restricted. As a result, there would be an adverse effect on recreational angling, as compared to No-Action conditions, due to the construction of new water control structures that would restrict fishing at new locations within the San Joaquin River.

Compared to existing conditions, where current fishing regulations have not been fully enforced at Mendota Dam, Alternative A would result in fishing restrictions at Mendota Dam and other Project facilities, namely the Compact Bypass and South Canal bifurcation structure as described above. Enforcement of existing fishing regulations would be in response to implementation of the Restoration Program (as discussed under the No-Action Alternative) and is not a Project action. Because fishing activity is small in comparison to other reaches of the river (Section 20.1.1) and alternative fishing sites are available in the Project area and vicinity, which would not be subject to deterioration from the displaced recreation activity, and existing fishing activity at Mendota Dam is unauthorized, this impact on recreational angling would be **less than significant**.

Impact REC-4 (Alternative A): ***Effects of Aquatic Habitat Improvements on Recreational Angling.*** Under all of the Project alternatives, Program-level activities, including restoration activities in other reaches and increased flows would improve the health of aquatic habitat in the Project area, particularly in the San Joaquin River above Mendota Pool. Use of previously dry sections of the river by recreational fisheries would generate benefits for recreational angling in the Project area. Refer to Impact REC-4 (No-Action Alternative) for more information. However, with implementation of the Project, these Program-level actions would be more successful than under the No-Action Alternative, because of the increased conveyance capacity of the river used by higher, more frequent flows resulting in more fish (cold-water species) in the river. Therefore, benefits to recreational angling opportunities are expected to be greater under Alternative A relative to No-Action conditions.

Compared to existing conditions, a **beneficial** effect on recreational angling is expected from habitat improvements in the San Joaquin River above Mendota Pool, in conjunction with improvements to fish passage, which would allow use of this area by recreational fish recruited from Mendota Pool or from other reaches under Alternative A.

Impact REC-5 (Alternative A): ***Effects of Increased Flows on Recreation Opportunities and Facilities.*** Under all of the Project alternatives, increased flows in the San Joaquin River would improve conditions for boating and other water-dependent activities in previously dry sections of the Project area, which represents a recreation benefit attributed to the Restoration Program. Refer to Impact REC-5 (No-Action Alternative) for more information. However, with implementation of Alternative A, increases in river flows would be accommodated more effectively in the Project area compared to the No-Action Alternative, including new connectivity between Reach 2B and Reach 3 provided by the Compact Bypass that would allow boats to travel between these reaches when river flows are adequate to safely navigate the grade control structures in the Compact Bypass channel. This connection is not available under existing conditions as the Mendota Dam serves as barrier between these reaches of the river. Therefore, benefits to recreational boating are expected to be greater under Alternative A relative to No-Action conditions.

Compared to existing conditions, Alternative A would have a **beneficial** effect on recreation associated with facilities to accommodate increased flows on the San Joaquin River.

Impact REC-6 (Alternative A): ***Conflicts with Recreation Goals and Policies***. Compared to the No-Action Alternative, Alternative A would potentially conflict with recreation-related goals and policies in the Fresno County General Plan and Madera County General Plans, both of which call for encouraging agencies providing recreational facilities to maintain and improve, if possible, their current levels of service (see Fresno County General Plan Policy OS-H.5 and Madera County General Plan Policy 4.A.7). Such conflicts are attributed to displacement of fishing opportunities near fish passage facilities, fish screens, fish barriers, and dams due to enforcement of existing fishing regulations, and by restrictions in boating access from Project facilities; see Impact REC-2 and REC-3 (Alternative A). Overall, recreation opportunities in the Project area (e.g., fishing) would not be maintained, thereby potentially conflicting with local recreation goals and policies to maintain and improve current levels of service. However, both county general plans designate the land in the Project area for agricultural uses and do not specifically provide for recreation management at Mendota Dam.

Compared to existing conditions, Alternative A would result in potential conflicts with local recreation goals and policies as described above. However, because the Project area is not managed specifically for recreational purposes, with only limited public access points along the river, the conflict with local plans is minimal. Furthermore, established recreation opportunities in the Mendota Pool Park area and the Mendota Wildlife Area would not be affected under Alternative A. Consequently, this impact to local plan goals and policies would be **less than significant**.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Key features of Alternative B include construction of a levee system to establish a bypass channel to the northeast of the existing river channel, Compact Bypass Bifurcation Structure, and re-route of Drive 10 ½. No construction activities are proposed at or near Mendota Dam, which falls outside the Project boundary under Alternative B. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Impact REC-1 (Alternative B): ***Construction-Related Effects on Recreation Opportunities and Facilities.*** Compared to No-Action, construction-related effects on recreation opportunities and facilities under Alternative B would generally be the same as those described for Alternative A with several exceptions; refer to Impact REC-1 (Alternative A) for details on general construction-related effects on recreation from the Project alternatives. Unlike Alternative A, this alternative includes the Compact Bypass Bifurcation Structure and excludes the South Canal bifurcation structure. As a result, there would potentially be more construction-related restrictions and nuisance effects on recreation in the proposed bypass area, which is relatively close to Mendota Dam and Mendota Pool Park, two higher-use recreation areas. Installation of a fish passage facility would also occur at the San Joaquin River control structure of the Chowchilla Bifurcation Structure. In addition, Project construction, and therefore potential effects on recreation, is expected over a longer timeframe, approximately 157 months.

When comparing Alternative B to existing conditions, impacts to recreation would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative B to the No-Action Alternative). Because construction-related impacts would occur over an extended (multi-year) timeframe, which may include periods of peak recreation use, these impacts are considered **potentially significant**.

Mitigation Measure REC-1 (Alternative B): ***Minimize Construction Effects on Recreation Uses.*** Refer to Mitigation Measure REC-1 (Alternative A). The same measure would be used here. Construction activities in the Project area will be modified to minimize adverse effects on recreation uses, including the following provisions: (1) allow access to recreation use areas when active construction is not occurring; and (2) configure construction zones to minimize access restrictions to recreation use areas. This impact would be **less than significant** after mitigation.

Impact REC-2 (Alternative B): ***Permanent Displacement of Existing Recreation Uses and Access Restrictions from Project Facilities.*** Compared to No-Action, Alternative B would result in permanent displacement of recreation opportunities in the Project area due to Project features that reduce the extent of public access to the river or Pool from public access points. Effects under Alternative B would generally be the same as those described under Alternative A; refer to REC-2 (Alternative A). There are several notable differences under Alternative B described below.

Alternative B includes the Compact Bypass Bifurcation Structure, which would permanently restrict recreational boating between Reach 2B and Reach 3 of the San

Joaquin River (as opposed to temporary/seasonal restrictions due to the grade control structures alone). Currently, Mendota Dam serves as a similar barrier. With respect to boating access on the San Joaquin arm of Mendota Pool, the Mendota Pool Bifurcation Structure in Alternative B would cause similar restrictions to recreational boating as the Mendota Pool Dike in Alternative A.

Alternative B does not include the South Canal bifurcation structure (and South Canal), so there would be no additional access restrictions in proximity to these features in the upstream portion of Reach 2B. However, the San Joaquin River control structure of the Chowchilla Bifurcation Structure would not be removed under Alternative B.

Alternative B does not include the Reach 3 Fish Barrier and therefore the public could continue to launch small watercraft at the informal hand launch just below Mendota Dam and float downstream to engage in recreation activities. The quantity of fish at Mendota Dam would likely be reduced relative to No-Action conditions, as fish migrate up the Compact bypass channel; however some fish will still reach the plunge pool just below Mendota Dam. (Restrictions on fishing opportunities associated with enforcement of existing fishing regulations near fish passage facilities, fish screens, and dams are addressed in REC-3 below.)

When comparing Alternative B to existing conditions, impacts to recreation would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative B to the No-Action Alternative). Although other recreation opportunities exist in the Project area and vicinity, the Project would reduce the extent of public boating access to the river or Pool from public access points. This would be a **potentially significant** impact.

Mitigation Measure REC-2 (Alternative B): ***Establish boat portage facilities around Project facilities.*** Refer to Mitigation Measure REC-2 (Alternative A). The same measure would be used here. Portage facilities for small watercraft will allow for boating access around Project structures and facilitate connectivity to downstream areas in Reach 3. Portage facilities will incorporate signs to direct boaters around water control structures, fish passage facilities, and/or fish screens showing boaters how to connect with the river safely while minimizing impacts to adjacent private lands at each location. The impact to boating access would be **less than significant** after mitigation.

Impact REC-3 (Alternative B): ***Effects on Recreational Angling at Project Structures.*** Under all of the Project alternatives, potential effects of fishing regulations on recreational angling at existing Project structures would be the similar to the effects explained under the No-Action Alternative because these regulations would be enforced irrespective of the Project. Refer to Impact REC-3 (No-Action Alternative) and REC-3 (Alternative A) for more information.

In addition, existing fishing regulations would also apply to new Project facilities that provide fish passage, including the proposed Compact Bypass and Bifurcation Structure. As a result, Alternative B would restrict fishing opportunities in proximity to these Project features, thereby affecting additional stretches of the river that are not currently

restricted. The Chowchilla Bifurcation Structure, which would include a new fish passage facility in Alternative B, would also likely be subject to enforcement of existing fishing regulations. As a result, in comparison to No-Action, there would be a greater adverse effect on recreational angling due to enforcement of existing fishing regulations at new Project facilities that would restrict fishing at new locations within the San Joaquin River.

Compared to existing conditions, Alternative B would result in fishing restrictions at Mendota Dam and new fish passage facilities throughout the Project area. This impact would be **less than significant**.

Impact REC-4 (Alternative B): *Effects of Aquatic Habitat Improvements on Recreational Angling.* Under all of the Project alternatives, Program-level activities, including restoration activities in other reaches and increased flows would improve the health of aquatic habitat in the Project area, particularly in the San Joaquin River above Mendota Pool. Use of previously dry sections of the river by recreational fisheries would generate benefits for recreational angling throughout the Project area. Refer to Impact REC-4 (No-Action Alternative) for more information. However, with implementation of the Project which includes additional floodplain habitat and new fish passage improvements, these Program-level actions would likely be more successful for fish production because of the increased conveyance capacity of the river used by higher, more frequent flows as compared to the No-Action Alternative. Therefore, benefits to recreational angling opportunities are expected to be greater under Alternative B relative to No-Action conditions.

Compared to existing conditions, a **beneficial** effect on recreational angling is expected from habitat improvements in the San Joaquin River above Mendota Pool, in conjunction with improvements to fish passage, which would allow use of this area by recreational fish recruited from Mendota Pool or from other reaches under Alternative B.

Impact REC-5 (Alternative B): *Effects of Increased Flows on Recreation Opportunities and Facilities.* Under all of the Project alternatives, increased flows in the San Joaquin River would improve conditions for boating and other water-dependent activities in previously dry sections of the Project area, which represents a recreation benefit attributed to the Restoration Program. Refer to Impact REC-5 (No-Action Alternative) for more information. However, with implementation of the Project, increases in river flows would be accommodated more effectively in the Project area compared to the No-Action Alternative. Therefore, benefits to recreational boating and other water-dependent activities are expected to be greater under Alternative B than No-Action conditions, although the Compact Bypass Bifurcation Structure would still limit boating connectivity between Reach 2B and Reach 3 of the San Joaquin River similar to No-Action conditions.

Compared to existing conditions, Alternative B would have a **beneficial** effect on recreation associated with increased flows on the San Joaquin River.

Impact REC-6 (Alternative B): *Conflicts with Recreation Goals and Policies*. Compared to the No-Action Alternative, Alternative B would potentially conflict with

recreation-related goals and policies in the Fresno County General Plan and Madera County General Plans, both of which call for encouraging agencies providing recreational facilities to maintain and improve, if possible, their current levels of service (see Fresno County General Plan Policy OS-H.5 and Madera County General Plan Policy 4.A.7). Such conflicts are attributed to displacement of fishing opportunities near fish passage facilities, fish screens, and dams due to enforcement of existing fishing regulations at the dam and by restrictions in boating access from Project facilities. Additional recreational impacts are expected under Alternative B where existing recreational access would be restricted as a result of Project facilities (see Impact REC-2). Overall, recreation opportunities in the Mendota Dam area and elsewhere in Reach 2B would not be maintained, thereby potentially conflicting with local recreation goals and policies to maintain and improve current levels of service. However, both county general plans designate the land in the Project area for agricultural uses and do not specifically provide for recreation management at Mendota Dam.

Compared to existing conditions, Alternative B would result in the conflicts with local recreation goals and policies as described above. However, because the Project area is not managed specifically for recreational purposes, with only limited public access points along the river, the conflict with local plans is minimal. This impact would be **less than significant**.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Key features of Alternative C include construction of fish passage facilities at Mendota Dam, grade control structures downstream of Mendota Dam, Fresno Slough Dam, Short Canal, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Impact REC-1 (Alternative C): *Construction-Related Effects on Recreation Opportunities and Facilities*. Compared to No-Action, construction-related effects under Alternative C on recreation opportunities and facilities would generally be the same as those described for Alternative A; refer to Impact REC-1 (Alternative A) for details on general construction-related effects on recreation from the Project alternatives. However, construction activities would be concentrated in the Mendota Pool area within 0.5 mile of Mendota Dam, where the proposed fish passage facilities and dam are located. These facilities are located in close proximity to Mendota Pool Park and Mendota Dam, two recreation areas used frequently by local residents. As a result, access restrictions and negative externalities associated with construction (e.g., dust and noise) may be greater under Alternative C. Construction would also occur in areas upstream of Mendota Pool at the San Mateo Avenue crossing and at the San Joaquin River control structure of the Chowchilla Bifurcation Structure. Project construction, and therefore potential effects on recreation, is also expected over a longer timeframe than Alternative A, approximately 158 months.

When comparing Alternative C to existing conditions, impacts to recreation would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative C to the No-Action Alternative). Because construction-related impacts would occur over

an extended (multi-year) timeframe, which may include periods of peak recreation use, these impacts are considered **potentially significant**.

Mitigation Measure REC-1 (Alternative C): ***Minimize Construction Effects on Recreation Uses.*** Refer to Mitigation Measure REC-1 (Alternative A). The same measure would be used here. Construction activities in the Project area will be modified to minimize adverse effects on recreation uses, including the following provisions: (1) allow access to recreation use areas when active construction is not occurring; and (2) configure construction zones to minimize access restrictions to recreation use areas. This impact would be **less than significant** after mitigation.

Impact REC-2 (Alternative C): ***Permanent Displacement of Existing Recreation Uses and Access Restrictions from Project Facilities.*** Compared to No-Action, Alternative C would result in permanent restrictions to recreation opportunities in the Project area due to Project features that reduce the extent of public access to the river or Pool from public access points, as described below.

Under Alternative C, the proposed fish passage facilities (on either side of Mendota Dam) would limit access to one or both sides of the dam (depending on final Project design), thereby displacing fishing activity at Mendota Dam. Fishing from Mendota Dam, however, would be prohibited regardless with enforcement of fishing regulations (see Impact REC-3). The fish passage facilities may also result in the removal of the informal hand launch and day-use area just south of Mendota Dam, thereby displacing recreation uses from that location.

In addition, Alternative C calls for several grade control structures in the river downstream of Mendota Dam. Similar to the fish barrier (in Alternative A), these structures would restrict people from floating down the river downstream from Mendota Dam (without portage) under unsafe flow conditions, which would limit opportunities for fishing, hunting, and boating (including kayaking and canoeing) in Reach 3.

Alternative C also includes the construction of Fresno Slough Dam south of Mendota Dam. This facility would restrict access from Fresno Slough to the San Joaquin River, thereby limiting boating and fishing access, particularly for people utilizing the city of Mendota boat launch just north of Mendota Pool Park. These people would still have access to recreation opportunities in Fresno Slough.

The proposed Main Canal and Helm Ditch Relocations may restrict access to the city of Mendota boat launch. Road access (i.e., bridge) over the canal would be provided, thereby retaining access to this facility.

Similar to the other Project alternatives, in response to these access restrictions, local people that typically visit the Project area may elect to recreate elsewhere in the Project area and vicinity to meet their recreation demands or they may forego outdoor recreation opportunities for other forms of recreation. Alternative locations for fishing and boating exist outside the Project area. Alternative fishing opportunities mainly consist of nearby irrigation canals, including the DMC; however, the quality of fishing is generally not as

good relative to the Mendota Pool area, which represents a prime location for certain species, such as striped bass (*Marone saxatilis*) and catfish (*Ictalurus* spp.), particularly immediately below Mendota Dam. People wishing to fish and hunt (from boats) in Reach 3 may try to access the river below the grade control structures, but most of the land along the river near the Project area is privately-owned, and informal access may constitute trespassing. The anticipated level of recreation pressure at these alternative locations is not expected to result in deterioration of recreation facilities and adverse physical effects on the environment.

When comparing Alternative C to existing conditions, impacts to recreation would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative C to the No-Action Alternative). Although other recreation opportunities exist in the Project area and vicinity, the Project would reduce the extent of public boating access to the river or Pool from public access points. This would be a **potentially significant** impact.

Mitigation Measure REC-2 (Alternative C): ***Establish boat portage facilities around Project facilities.*** Refer to Mitigation Measure REC-2 (Alternative A). The same measure would be used here. Portage facilities for small watercraft will allow for boating access around Project structures and facilitate connectivity to downstream areas in Reach 3. Portage facilities will incorporate signs to direct boaters around water control structures, fish passage facilities, and fish screens showing boaters how to connect with the river safely while minimizing impacts to adjacent private lands at each location. The impact to boating access would be **less than significant** after mitigation.

Impact REC-3 (Alternative C): *Effects on Recreational Angling at Project Structures.* Under all of the Project alternatives, potential effects of fishing regulations on recreational angling at existing Project structures would be the same as the No-Action Alternative because these regulations would be enforced irrespective of the Project. Refer to Impact REC-3 (No-Action Alternative) for more information.

In addition, existing fishing regulations would also apply to new project facilities that provide fish passage, including the proposed fish passage facilities at Mendota Dam and the Chowchilla Bifurcation Structure. As a result, Alternative C would restrict fishing opportunities in proximity to these Project features. Such restrictions would already be enforced at Mendota Dam under No-Action, but new fish passage at the Chowchilla Bifurcation Structure would affect additional stretches of the river that are not currently restricted. As a result, in comparison to No-Action, there would be a greater adverse effect on recreational angling due to enforcement of existing fishing regulations at new Project facilities that would restrict fishing at new locations within the San Joaquin River.

Compared to existing conditions, Alternative C would result in fishing restrictions at Mendota Dam and new fish passage facilities throughout the Project area. This impact would be **less than significant**.

Impact REC-4 (Alternative C): *Effects of Aquatic Habitat Improvements on Recreational Angling.* Under all of the Project alternatives, Program-level activities,

including restoration activities in other reaches and increased flows would improve the health of aquatic habitat in the Project area, particularly in the San Joaquin River above Mendota Pool. Use of previously dry sections of the river by recreational fisheries would generate benefits for recreational angling in the Project area. Refer to Impact REC-4 (No-Action Alternative) for more information. However, with the Reach 2B project in place, these Program-level actions would likely be more successful compared to the No-Action Alternative because of the increased conveyance capacity of the river used by higher, more frequent flows. Therefore, benefits to recreational angling opportunities are expected to be greater under Alternative C relative to No-Action conditions.

Compared to existing conditions, a **beneficial** effect on recreational angling is expected from habitat improvements in the San Joaquin River above Mendota Pool, in conjunction with improvements to fish passage, which would allow use of this area by recreational fish recruited from Mendota Pool or from other reaches under Alternative C.

Impact REC-5 (Alternative C): ***Effects of Increased Flows on Recreation Opportunities and Facilities.*** Under all of the Project alternatives, increased flows in the San Joaquin River would improve conditions for boating and other water-dependent activities in previously dry sections of the Project area, which represents a recreation benefit attributed to the Restoration Program. Refer to Impact REC-5 (No-Action Alternative) for more information. However, with the Reach 2B project in place, increases in river flows would be accommodated more completely and effectively in the Project area compared to the No-Action Alternative. Therefore, benefits to recreational boating and other water-dependent activities are expected to be greater under Alternative C relative to No-Action conditions, although the proposed Fresno Slough Dam and existing Mendota Dam would still limit boating connectivity between Fresno Slough and Reach 2B and between Reach 2B and Reach 3 of the San Joaquin River, respectively.

Compared to existing conditions, Alternative C would have a **beneficial** effect on recreation associated with increased flows on the San Joaquin River.

Impact REC-6 (Alternative C): ***Conflicts with Recreation Goals and Policies***. Compared to the No-Action Alternative, Alternative C would potentially conflict with recreation-related goals and policies in the Fresno County General Plan and Madera County General Plans, both of which call for encouraging agencies providing recreational facilities to maintain and improve, if possible, their current levels of service (see Fresno County General Plan Policy OS-H.5 and Madera County General Plan Policy 4.A.7). Such conflicts are attributed to displacement of fishing opportunities near fish passage facilities, fish screens, and dams due to enforcement of existing fishing regulations at the dam and by restrictions in boating access from Project facilities. Additional recreational impacts are expected under Alternative C where existing recreational access would be restricted as a result of Project facilities (see Impact REC-2). Overall, recreation opportunities in the Mendota Dam area and elsewhere in Reach 2B would not be maintained, thereby potentially conflicting with local recreation goals and policies to maintain and improve current levels of service. However, both county general plans designate the land in the Project area for agricultural uses and do not specifically provide for recreation management at Mendota Dam.

Compared to existing conditions, Alternative C would result in the conflicts with local recreation goals and policies as described above. However, because the Project area is not managed specifically for recreational purposes, with only limited public access points along the river, the conflict with local plans is minimal. This impact would be **less than significant**.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Key features of Alternative D include construction of fish passage facilities at Mendota Dam, grade control structures downstream of Mendota Dam, Fresno Slough Dam, Main Canal and Helm Ditch relocations, and the North Canal. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Impact REC-1 (Alternative D): *Construction-Related Effects on Recreation Opportunities and Facilities.* Compared to No-Action, construction-related effects under Alternative D on recreation opportunities and facilities would generally be the same as those described for Alternative A; refer to Impact REC-1 (Alternative A) for details on general construction-related effects on recreation from the Project Alternatives. However, similar to Alternative C, construction activities would be concentrated in the Mendota Pool area, which are located in close proximity to Mendota Pool Park and Mendota Dam, two high-use recreation areas used by locals. As a result, access restrictions and negative construction externalities (e.g., dust and noise) may be greater under Alternative D. This alternative also entails construction of the North Canal and removal of the San Joaquin River control structure of the Chowchilla Bifurcation Structure, but existing recreation use in proximity to these features is limited. Project construction, and therefore potential effects on recreation, is also expected over a longer timeframe, approximately 158 months.

When comparing Alternative D to existing conditions, impacts to recreation would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative D to the No-Action Alternative). Because construction-related impacts would occur over an extended (multi-year) timeframe, including periods of peak recreation use, these impacts are considered **potentially significant**.

Mitigation Measure REC-1 (Alternative D): ***Minimize Construction Effects on Recreation Uses.*** Refer to Mitigation Measure REC-1 (Alternative A). The same measure would be used here. Construction activities in the Project area will be modified to minimize adverse effects on recreation uses, including the following provisions: (1) allow access to recreation use areas when active construction is not occurring; and (2) configure construction zones to minimize access restrictions to recreation use areas. This impact would be **less than significant** after mitigation.

Impact REC-2 (Alternative D): *Permanent Displacement of Existing Recreation Uses and Access Restrictions from Project Facilities.* Compared to No-Action, Alternative D would result in permanent restrictions to recreation opportunities in the Project area due to Project features that reduce the extent of public access to the river or Pool from public access points. These effects would be similar to those described for Alternative C; refer

to Impact REC-2 (Alternative C) for more information. There are several notable differences under Alternative D described below.

Alternative D calls for construction of the North Canal bifurcation structure and North Canal. The bifurcation structure would restrict boating access on the San Joaquin River; however, such effects are considered minor because the existing Chowchilla Bifurcation Structure just upstream from this facility already serves as a barrier to boating access in this stretch of the river, and the North Canal bifurcation structure would be added while the riverside control structure of the Chowchilla Bifurcation Structure would be removed.

In addition, Alternative D would result in removal of the San Mateo Avenue crossing. Although the public would not be able to cross the river by vehicle, people could still access either bank of the river and recreation opportunities would be unaffected.

When comparing Alternative D to existing conditions, impacts to recreation would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative D to the No-Action Alternative). Although other recreation opportunities exist in the Project area and vicinity, the Project would reduce the extent of public boating access to the river or Pool from public access points. This would be a **potentially significant** impact.

Mitigation Measure REC-2 (Alternative D): ***Establish boat portage facilities around Project facilities.*** Refer to Mitigation Measure REC-2 (Alternative A). The same measure would be used here. Portage facilities for small watercraft will allow for boating access around Project structures and facilitate connectivity to downstream areas in Reach 3. Portage facilities will incorporate signs to direct boaters around water control structures, fish passage facilities, and fish screens showing boaters how to connect with the river safely while minimizing impacts to adjacent private lands at each location. The impact to boating access would be **less than significant** after mitigation.

Impact REC-3 (Alternative D): ***Effects on Recreational Angling at Project Structures.*** Under all of the Project alternatives, potential effects of fishing regulations on recreational angling at existing Project structures would be the same as the No-Action Alternative because these regulations would be enforced irrespective of the Project. Refer to Impact REC-3 (No-Action Alternative) for more information.

In addition, existing fishing regulations would also apply to new project facilities that provide fish passage, including the proposed fish passage facilities at Mendota Dam and the North Canal bifurcation structure. As a result, Alternative D would restrict fishing opportunities in proximity to these Project features. Such restrictions would already be enforced at Mendota Dam under No-Action, but new fish passage at the North Canal bifurcation structure would affect additional stretches of the river that are not currently restricted. As a result, in comparison to No-Action, there would be a greater adverse effect on recreational angling due to enforcement of existing fishing regulations at new Project facilities that would restrict fishing at new locations within the San Joaquin River.

Compared to existing conditions, Alternative D would result in fishing restrictions at Mendota Dam and new fish passage facilities throughout the Project area. This impact would be **less than significant**.

Impact REC-4 (Alternative D): *Effects of Aquatic Habitat Improvements on Recreational Angling.* Under all of the Project alternatives, Program-level activities, including restoration activities in other reaches and increased flows would improve the health of aquatic habitat in the Project area, particularly in the San Joaquin River above Mendota Pool. Use of previously dry sections of the river by recreational fisheries would generate benefits for recreational angling in the Project area. Refer to Impact REC-4 (No-Action Alternative) for more information. However, with implementation of the Project, these Program-level actions would likely be more successful compared to the No-Action Alternative because of the increased conveyance capacity of the river used by higher, more frequent flows. Therefore, benefits to recreational angling opportunities are expected to be greater under Alternative D relative to No-Action conditions.

Compared to existing conditions, a **beneficial** effect on recreational angling is expected from habitat improvements in the San Joaquin River above Mendota Pool, in conjunction with improvements to fish passage, which would allow use of this area by recreational fish recruited from Mendota Pool or from other reaches under Alternative D.

Impact REC-5 (Alternative D): *Effects of Increased Flows on Recreation Opportunities and Facilities.* Under all of the Project alternatives, increased flows in the San Joaquin River would improve conditions for boating and other water-dependent activities in previously dry sections of the Project area, which represents a recreation benefit attributed to the Restoration Program. Refer to Impact REC-5 (No-Action Alternative) for more information. However, with the Reach 2B project in place, increases in river flows would be accommodated more effectively in the Project area compared to the No-Action Alternative. Therefore, benefits to recreational boating and other water-dependent activities are expected to be greater under Alternative D relative to No-Action conditions, although the proposed Fresno Slough Dam and existing Mendota Dam would still limit boating connectivity between Reach 2B and Reach 3 of the San Joaquin River.

Compared to existing conditions, Alternative D would have a **beneficial** effect on recreation associated with increased flows on the San Joaquin River.

Impact REC-6 (Alternative D): *Conflicts with Recreation Goals and Policies*. Compared to the No-Action Alternative, Alternative D would potentially conflict with recreation-related goals and policies in the Fresno County General Plan and Madera County General Plans, both of which call for encouraging agencies providing recreational facilities to maintain and improve, if possible, their current levels of service (see Fresno County General Plan Policy OS-H.5 and Madera County General Plan Policy 4.A.7). Such conflicts are attributed to displacement of fishing opportunities near fish passage facilities, fish screens, and dams due to enforcement of existing fishing regulations at the dam and by restrictions in boating access from Project facilities. Additional recreational impacts are expected under Alternative D where existing recreational access would be

restricted as a result of Project facilities (see Impact REC-2). Overall, recreation opportunities in the Mendota Dam area and elsewhere in Reach 2B would not be maintained, thereby potentially conflicting with local recreation goals and policies to maintain and improve current levels of service. However, both county general plans designate the land in the Project area for agricultural uses and do not specifically provide for recreation management at Mendota Dam.

Compared to existing conditions, Alternative D would result in the conflicts with local recreation goals and policies as described above. However, because the Project area is not managed specifically for recreational purposes, with only limited public access points along the river, the conflict with local plans is minimal. This impact would be **less than significant**.

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21.0 Socioeconomics and Economics

This chapter evaluates the potential impacts of the Project as it relates to potential socioeconomic effects on local communities and economic conditions generated by habitat restoration activities and construction and operation of Project features. Economic information is included in this Environmental Impact Statement/Report to meet National Environmental Policy Act (NEPA) requirements for analysis of social and economic impacts as part of the human environment. In the context of the California Environmental Quality Act (CEQA), this information illustrates the close relationship between potential physical effects on agricultural land uses and regional economic conditions.

21.1 Environmental Setting

This section provides an overview of socioeconomic conditions in the Project area and surrounding region. Key resources evaluated include population, housing, local economic base (including employment and key industries), and fiscal resources of local governments. This section also focuses on the agricultural economy in the Project area based on the proximity of Reach 2B to land in agricultural production. The information presented here is used to establish baseline socioeconomic conditions against which the potential impacts of the Project are evaluated.

The geographic area considered for the socioeconomic analysis varies depending on the resource evaluated. It may cover the Project area, the two counties within which Reach 2B is located (i.e., Fresno and Madera counties, hereinafter referred to as the two-county region), or the three census tracts (CT) in proximity to Reach 2B (i.e., CT 39, CT 83.01, and CT 4), which capture a part of the city of Mendota, the closest municipality to the Project footprint. The locations of these CTs are shown on Figure 21-1.

21.1.1 Population Trends

As of 2010, the population in the two-county region was approximately 1.1 million persons. Fresno County accounted for 86.0 percent of population in the region, with more than half of the county residents living in the city of Fresno. Madera County accounts for 14.0 percent of the regional population, with 40.7 percent of residents living in the city of Madera. The combined population of Fresno and Madera counties represented 2.9 percent of the total population in the State. Table 21-1 shows historic, current, and projected population trends for the two-county region and the State overall.

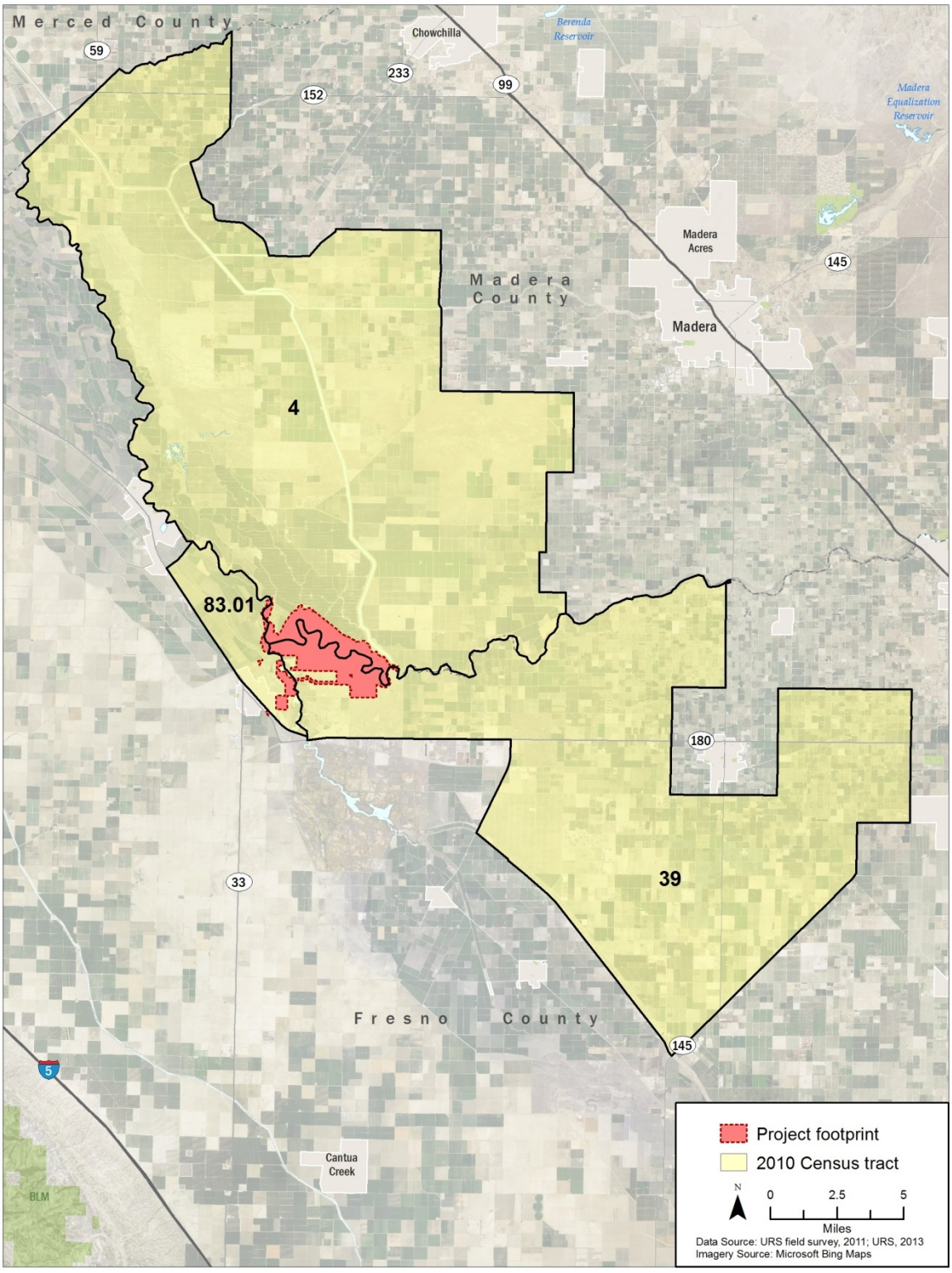

Figure 21-1.
Census Tracts near Reach 2B

Table 21-1.
Historical, Current, and Projected Population

Geo-graphic Area	Historic/Current Trends				Projected Conditions		Percent Change		
	1990	1995	2000	2010	2030	2050	1990-2000	2000-2010	2010-2050
Fresno County	667,490	748,424	799,407	930,450	1,429,228	1,928,411	19.8	16.4	107.3
Madera County	88,090	108,817	123,109	150,865	273,456	413,569	39.8	22.6	174.1
Two-County Region	755,580	857,241	922,516	1,081,315	1,702,684	2,341,980	22.1	17.2	116.6
California	29,758,213	31,617,770	33,871,648	37,253,956	44,135,923	59,507,876	6.3	10.0	59.7

Source: California Department of Finance 2007; U.S. Census Bureau 1990, 2000 (PEIS/R, SJRRP 2011, Table 22-1); U.S. Census Bureau 2010

Generally, population in the two-county region has increased substantially between 1990 and 2010 and is projected to continue growing through 2050. From 1990 to 2000, the population in the two-county region increased by 22.1 percent. During this same period, the Madera County population grew at a substantially greater rate than Fresno County, 39.8 percent versus 19.8 percent, respectively. Between 2000 and 2010, the total population of Fresno and Madera counties increased by 17.2 percent, with Madera County expanding at a greater rate (22.6 percent) than Fresno County (16.4 percent).

Population projections indicate that Fresno and Madera counties are expected to grow at a substantially greater rate than the State through 2050. Total population growth in the two-county region is projected to be 116.6 percent between 2010 and 2050, compared to 59.7 percent statewide. During this period, population in Madera County is projected to increase by 174.1 percent and Fresno County is expected to grow by 107.3 percent.

In the areas most proximate to Reach 2B, including the city of Mendota, population levels are relatively low, indicative of the rural and agricultural character of the Project area. Population levels in 2010 in the three CTs near Reach 2B are shown in Table 21-2. The combined population in all CTs was 13,081 persons. CT 83.01, which covers part of the city of Mendota, had a population of 5,989 people.[1] Overall, only 1.2 percent of the population in the two-county region resided in three CTs covered by the Project area.

21.1.2 Housing

The distribution of housing units in the two-county region is presented in Table 21-3. Mirroring the population trends shown above, the largest number of housing units is in Fresno County, with over 315,000 units in 2010. Madera County had a fewer number of units, but a higher vacancy rate (11.8 percent in 2010). As of 2010, there were 364,671 total housing units in the two-county region, which represents 2.7 percent of the housing stock in the State.

[1] The population in the city of Mendota, proper, is 11,014 (U.S. Census 2010).

Table 21-2.
Population, Reach 2B Census Tracts, 2010

Geographic Area	Census Tract	Population (2010)
Fresno County	CT 39	5,804
	CT 83.01	5,989
Madera County	CT 4	1,288
Total – Census Tracts		13,081

Source: U.S Census Bureau 2010

Table 21-3.
Housing Trends, 2000-2010

Geographic Area	Year	Total Housing Units	Occupied		Vacant	
			Number of Units	Percent of Total	Number of Units	Percent of Total
Fresno County	2000	270,767	252,940	93.4	17,827	6.6
	2010	315,531	289,391	91.7	26,140	8.3
	Percent Change	16.5	14.4	--	46.6	--
Madera County	2000	40,387	36,155	89.5	4,232	10.5
	2010	49,140	43,317	88.2	5,823	11.8
	Percent Change	21.7	19.8	--	37.6	--
Two-County Region	2000	311,154	289,095	92.9	22,059	7.1
	2010	364,671	332,708	91.2	31,963	8.8
	Percent Change	17.2	15.1	--	44.9	--
California	2000	12,214,549	11,502,870	94.2	711,679	5.8
	2010	13,680,081	12,577,498	91.9	1,102,583	8.1
	Percent Change	12.0	9.3	--	54.9	--

Source: U.S. Census Bureau 2000; U.S. Census Bureau 2010

21.1.3 Economic Base

This section describes local economic conditions in Project area, focusing on labor force, employment, and key industries within the two-county region.

Labor Force and Unemployment

The two-county region had a labor force of 510,700 in 2012, which accounts for 2.8 percent of the statewide labor force of 18,494,900 (see Table 21-4). Between 1990 and 2012, the labor force in the two-county region grew by 37.8 percent. The majority of the labor force is concentrated in Fresno County. In 2012, there were 442,500 people in the labor force in Fresno County, an increase of 34.5 percent since 1990. Madera County has a relatively small labor force at 68,200 workers, but it has experienced more substantial growth, 63.9 percent since 1990.

Table 21-4.
Historical and Current Labor Force, 1990–2012

Geographic Area	Number of Workers in Labor Force				Percent Change 1990-2012
	1990	2000	2010	2012	
Fresno County	328,900	388,300	440,600	442,500	34.5
Madera County	41,600	54,900	67,300	68,200	63.9
Two-County Region	370,500	443,000	507,900	510,700	37.8
California	15,168,500	16,857,600	18,327,000	18,494,900	21.9

Source: EDD 2013a.

Unemployment rates have increased sharply due to the nationwide financial crisis that began in 2007 (Bertaut and Pounder 2009). Unemployment rates in Project area have been slowly decreasing since 2010 as shown in Table 21-5. In Fresno County, unemployment stood at 10.4 percent in 2000, increased to 16.9 percent in 2010 and has slowly declined to 15.2 percent in 2012. Similarly, unemployment in Madera County increased from 8.7 percent in 2000 to 15.6 percent in 2010 and has decreased to 13.6 percent in 2012. These data are indicative of the economic downturn that has characterized much of the Central Valley and the State in recent years. Unemployment has also increased for farm workers due to land fallowing because of water supply and drought conditions.

Table 21-5.
Unemployment Rate, 2000-2012 (percent)

Geographic Area	2000	2010	2012
Fresno County	10.4	16.9	15.2
Madera County	8.7	15.6	13.6
California	**10.2**	**16.7**	**10.5**

Source: EDD 2013a

Employment by Industry

Total employment in 2012 in the two-county region was 376,000 jobs, with 331,800 jobs in Fresno County and 44,200 jobs in Madera County (see Table 21-6). The top four industries, based on the number of employees, in the two-county region are *Government*; *Trade, Transportation, and Utilities*; *Farm jobs*; and *Education and Health Services*. In Fresno and Madera counties, the *Government* sector supported the first and second highest number of jobs, at 19.3 percent and 22.9 percent, respectively. As shown, the agricultural sector (farm jobs) ranked first in Madera County and in third in Fresno County.

In terms of occupational projections, California Employment Development Department (EDD) projects an 8.4 percent increase in the number of jobs in the Farming, Fishing, and Forestry Occupations category and a 5.3 percent decrease in the number of jobs in the

Farmers, Ranchers, and Other Agricultural Managers category in Fresno County from 2010 through 2020. Conversely, in the Farming, Fishing, and Forestry Occupations category the number of jobs is expected to decrease by about 2.3 percent in Madera County between 2008 and 2018; while the Farmers, Ranchers, and Other Agricultural Managers category is expected to grow by 9.1 percent. The annual mean income for Farming, Fishing, and Forestry Occupations category was $18,655 in Fresno County and $18,491 in Madera County in the first quarter of 2012. Incomes for Farmers, Ranchers, and Other Agricultural Managers were $72,107 in the two-county region for 2012 (EDD 2013b, 2013c).

Table 21-6.
Employment by Industry Sector, 2012

Industry	Fresno County		Madera County	
	Number Jobs	Percent of Total	Number Jobs	Percent of Total
Construction	12,100	3.6	Incl. in mining category	
Educational and Health Services	42,900	12.9	6,000	13.6
Farm Jobs	48,900	14.7	11,100	25.1
Financial Activities	12,800	3.9	800	1.8
Government	64,100	19.3	10,100	22.9
Information	3,500	1.1	400	0.9
Leisure and Hospitality	28,000	8.4	2,700	6.1
Manufacturing	23,400	7.1	3,400	7.7
Natural Resources and Mining	200	0.1	1,100	2.5
Other Services	10,500	3.2	800	1.8
Professional and Business Services	27,900	8.4	2,900	6.6
Trade, Transportation, and Utilities	57,500	17.3	4,900	11.1
Total	331,800	100.0	44,200	100.0

Source: EDD 2013a

21.1.4 Fiscal Resources of Local Governments

Local governments provide a wide range of services, including but not limited to, law enforcement and public safety, development review, and educational services using a mix of funding sources. Generally, the two largest sources of income for most local governments are property tax revenues and funding from Federal and State governments, while the two largest expenditures are public health and safety and social services. Detailed information on revenues and expenditures for Fresno and Madera counties is presented below.

Fresno County

Fresno County is one of the larger counties in the San Joaquin Valley based on land area. As shown in Table 21-7, through property taxes, Federal and State funding, permit fees and other sources, Fresno County collected nearly $1.28 billion in total revenues in fiscal year (FY) 2010-11. Federal and State funding and property taxes were the two largest sources of revenue at $843.2 million and 186.6 million, respectively. In terms of

expenditures, welfare, social services, and other public assistance have consistently been the largest sources of spending by Fresno County, inducing $531.9 million in spending in FY 2010-11. Police, fire, and other public safety activities represent the second largest category, with $333.6 million in spending.

Table 21-7.
Revenues and Expenditures in Fresno County, 2000-2011 (Select Years)

Revenues & Expenditures	FY 00 – 01	FY 05 – 06	FY 10 – 11
Revenues (dollars)			
Property Taxes	$58,006,892	$148,717,818	$186,609,789
Other Taxes	$32,815,340	$48,375,018	$38,506,111
Licenses, Permits, Fines, Forfeitures	$28,902,465	$36,424,723	$28,930,356
Federal, State, Other	$652,723,983	$774,842,183	$843,177,259
Total Miscellaneous Revenue	$15,444,782	$8,581,152	$4,010,922
All Other Financing Sources	$57,612,660	$132,315,536	$116,527,255
Total Revenue	***$845,506,122***	***$1,149,256,430***	***$1,217,761,692***
Expenditures (dollars)			
Legislative and Administrative, Finance, Counsel, and General Expenditures	$59,156,876	$72,306,641	$44,151,800
Police Protection, Corrections, Fire, Public Protection	$204,731,124	$274,530,171	$333,570,967
Transportation	$34,510,112	$40,987,820	$60,595,219
Public Health, Medical Care	$157,005,190	$194,378,202	$169,267,201
Welfare, Social Services, and Other Public Assistance	$342,533,245	$463,780,252	$531,883,473
Total Education and Library Services	$15,679,612	$23,655,343	$27,018,377
Total Recreation Facilities	$2,828,408	$3,025,932	$2,329,733
Costs Associated with Long-Term Debt (principal and interest)	$20,344,000	$25,349,227	$41,481,318
All Other Expenditures	--	$3,590,000	--
Total Expenditures	***$836,778,567***	***$1,101,603,588***	***$1,210,298,088***

Source: California State Controller 2003, 2008, 2012
Key:
FY = fiscal year

Madera County

Table 21-8 presents local government revenues and expenditures in Madera County. Revenues in Madera County totaled $190.7 million in FY 2010-11, which represents a 55.0 percent increase since FY 2000-2001. Madera County's two primary revenue sources were from Federal and State funding and property taxes. The top two categories of expenditures in Madera County in FY 2010-11 were welfare, social services, and other public assistance programs ($52.9 million) and police, fire, and other public safety programs ($51.7 million).

Table 21-8.
Revenues and Expenditures in Madera County, 2000-2011 (Select Years)

Revenues & Expenditures	FY 00 – 01	FY 05 – 06	FY 10 – 11
Revenues (dollars)			
Property Taxes	$9,882,495	$27,106,983	$29,700,508
Other Taxes	$7,084,849	$11,807,003	$12,567,370
Licenses, Permits, Fines, Forfeitures	$6,526,507	$7,911,441	$11,679,955
Federal, State, Other	$88,661,606	$90,359,816	$118,637,298
Total Miscellaneous Revenue	$1,357,089	$9,310,946	$781,512
All Other Financing Sources	$9,548,170	$34,589,714	$17,371,585
Total Revenue	***$123,060,716***	***$181,085,903***	***$190,738,228***
Expenditures (dollars)			
Legislative and Administrative, Finance, Counsel, and General Expenditures	$19,217,103	$39,915,130	$24,346,919
Police Protection, Corrections, Fire, Public Protection	$32,420,646	$43,370,167	$51,741,589
Transportation	$6,698,596	$8,778,995	$16,354,601
Public Health, Medical Care	$16,974,750	$19,685,763	$25,527,191
Welfare, Social Services, and Other Public Assistance	$36,199,179	$47,356,238	$52,876,698
Total Education and Library Services	$1,141,709	$2,676,136	$1,191,373
Total Recreation Facilities	$0	$0	$589
Costs Associated with Long-Term Debt (principal and interest)	$82,127	$650,273	$1,763,619
All Other Expenditures	$1,609,517	$947,137	$1,354,306
Total Expenditures	***$114,343,627***	***$163,379,839***	***$175,156,885***

Source: California State Controller 2003, 2008, 2012
Key:
FY = fiscal year

21.1.5 Value of Agricultural Production

Regional Agricultural Production

Fresno and Madera counties are located in the San Joaquin Valley, one of the most productive agricultural areas in the State and nation. Agriculture in the Project area is dependent on surface and groundwater supplies, including water supplies from the Friant Division of the Central Valley Project.

According to the California Agricultural Commissioner, Fresno County had the highest-value agricultural sector in the State in 2011 (California Department of Food and Agriculture [CDFA] 2012). Between 2001 and 2011, the value of agricultural production in Fresno County ranged from $3.2 billion to $6.9 billion (see Table 21-9). According to the Fresno County Agricultural Crop and Livestock Report for 2011, grapes were the leading contributor to agricultural revenue at over $961 million, followed by almonds and tomatoes with values of $831 million and $632 million, respectively (Fresno County Department of Agriculture 2011).

Madera County's agricultural productivity ranks twelfth in the State (CDFA 2012). The annual value of agricultural production in the County ranged from $652 million to $1.6 billion between 2001 and 2011. The main agricultural commodities produced in Madera County are almonds (nuts and hulls), milk, and grapes. These three commodity groups accounted for 66.4 percent of the total value of agricultural production in the County (Madera County Department of Agriculture 2011). Specifically, almond production (nuts and hulls) was valued at approximately $414 million, followed by milk and grapes, valued at $327 million and $301 million, respectively.

Table 21-9.
Agricultural Production Values, Annual Average, 2001-2011

Year	Fresno County (dollars)	Madera County (dollars)
2001	$3,220,101,800	$651,794,000
2002	$3,440,927,000	$779,510,000
2003	$4,073,338,500	$760,784,000
2004	$4,603,936,200	$1,074,578,000
2005	$4,641,194,200	$1,105,503,000
2006	$4,845,737,100	$1,032,902,000
2007	$5,347,398,000	$1,220,230,000
2008	$5,627,909,000	$1,310,875,000
2009	$5,347,381,000	$963,536,000
2010	$5,944,758,000	$1,348,505,000
2011	$6,886,213,700	$1,569,521,000

Sources: Fresno County Department of Agriculture 2011; Madera County Department of Agriculture 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011.

Agricultural Production Value in Reach 2B

Direct Production Value

The primary agricultural activity within the Project area is permanent crop production, but a range of annual crops are grown as well. The total amount of agricultural land located in the Project area under existing conditions was nearly 4,300 acres based on site survey of agricultural land conducted in 2011 (see Table 21-10). Most of the land is in almond production, followed by grapes, other row crops and pistachios. The total annual value of crops grown in the Project area under existing conditions is estimated at $16.8 million, or approximately $3,900 per acre, based on average crop prices from 2004–2008 adjusted to 2010 dollars using the consumer price index (CPI) for California. The value of crops grown in the Project area varies substantially. For example, nut crops, namely almonds and pistachios, account for nearly 70 percent of value of crops produced in the Project area, with an average value per acre of between $4,400 and $6,000. The value of grape production, another permanent crop, is also relatively high at about $4,000 per acre. Conversely, the value of annual crops produced in the Project area, such as alfalfa, cotton and other row crops, ranges between $1,200 and $2,000 per acre.

Table 21-10.
Existing Agricultural Production Values in the Reach 2B Project Area

Crop	Acres	Production Value [a,b]	Percent of Total Value	Value per Acre
Alfalfa	80	$96,213	1	$1,208
Almonds	1,969	$8,616,057	51	$4,376
Cotton	15	$23,252	0	$1,557
Grapes	623	$2,476,627	15	$3,975
Grazing	42	$3,224	0	$77
Other Row Crops	604	$1,209,662	7	$2,002
Palm	10	$511,966	3	$52,769
Pistachios	519	$3,131,160	19	$6,037
Agriculture-Vacant [c]	431	$747,918	4	$1,735
Total	**4,292**	**$16,816,078**	**100**	**$3,918**

Source: U.S. Department of Agriculture National Agricultural Statistics Service 2005, 2006, 2007, 2008, 2009

Notes:

[a] Monetary values presented in constant 2010 dollars

[b] Based on agricultural production in 2011

[c] Assumed to be part of agricultural rotation; therefore, included in estimate of existing agricultural production value based on average row crop values.

Regional Economic Benefits of Agriculture in Reach 2B

To support local and regional crop production, a comprehensive infrastructure of businesses and support services has developed in the regional economy. These businesses include suppliers of inputs such as feed, seed, chemicals, irrigation equipment, and farm machinery, financial institutions, and transportation and shipping companies. They also include cotton gins, storage businesses, food processors, shippers, and other businesses that handle or use products after they leave farms. Each of these sectors purchases from and sells to many other businesses. Consequently, changes in agricultural production have widespread ripple effects throughout the regional economy. All of these inter-industry linkages are indicative of the important role that agricultural production has on the regional economy. In other words, the economic benefits attributable to crop production in the Project area extend beyond the farm level. Based on 2011 production levels, agricultural activity within the Project area directly supported $16.8 million in output (i.e., value of commodity production), $4.8 million in labor income, and 105 jobs at the farm level. Accounting for the indirect and induced effects as money "ripples" through the regional economy, the total effects include $26.6 million in output, $8.1 million in labor income, and roughly 196 jobs in the two-county region (see Table 21-11).

Table 21-11.
Regional Economic Benefits – Existing Agricultural Production in Reach 2B

Economic Measure	Type of Effect			Total Effect
	Direct	Indirect	Induced	
Output (millions) [a,b]	$16.8	$4.5	$5.3	$26.6
Labor Income (millions) [a,b]	$4.8	$1.6	$1.7	$8.1
Employment (Jobs)	105	47	44	196

Notes:
[a] Values represent effects in the two-county region (Fresno and Madera counties) based on Impact Analysis for Planning (IMPLAN) modeling.
[b] Values reported in 2010 dollars.

Total effects of existing agricultural production in the Project area at the industry level are presented in Table 21-12. As expected, the greatest benefits accrue to the agricultural sector, accounting for $17.9 million in total economic output, $5.6 million in labor income, and about 134 jobs in the region. The services sector also benefits substantially from local agricultural production, supporting 45 jobs with $1.6 million in corresponding labor income.

Table 21-12.
Regional Economic Benefits by Industry – Existing Agricultural Production in Reach 2B

Industry	Total Output (millions) [a,b]	Total Labor Income (millions) [a,b]	Total Employment
Agriculture	$17.9	$5.6	134
Mining	<$0.1	<$0.1	<1
Construction	$0.2	$0.1	1
Manufacturing	$0.3	<$0.1	1
Transportation, Information, and Public Utilities	$0.7	$0.2	3
Trade	$0.9	$0.4	10
Service	$6.2	$1.6	45
Government	$0.3	$0.1	2
Total	**$26.6**	**$8.1**	**196**

Notes:
[a] Values represent effects in the two-county region (Fresno and Madera counties) based on Impact Analysis for Planning (IMPLAN) modeling.
[b] Values reported in 2010 dollars.

21.1.6 Fiscal Resources of the Levee District

The Lower San Joaquin Levee District (LSJLD) was formed in 1955 by special act of the State legislature to operate, maintain, repair levees, bypasses and other facilities built in connection with the San Joaquin River Flood Control Project. LSJLD boundaries encompasses approximately 468 square miles (300,000 acres) in Fresno, Madera, and

Merced counties with protection areas along approximately 35 miles of the San Joaquin River. Jurisdiction of the LSJLD includes portions of the cities of Mendota and Firebaugh and extends to portions of Madera and Merced counties.

LSJLD is responsible for operation and maintenance and emergency management of State flood control facilities within the district boundaries including 191 miles of levees, channel bottoms, and flood management facilities. Important facilities maintained by the district include the Chowchilla Bypass, the Eastside Bypass, and the Mariposa Bypass. Operations and maintenance activities include vegetation management activities, sediment management and removal activities, cleaning of screens and trash racks on facilities, opening and closing gates and flap gates in the bypass systems, and flood watch. The LSJLD is not responsible for operation and maintenance of privately owned levees (San Joaquin River Flood Control Project Agency 2013).

The LSJLD is funded by property tax assessments on lands within the district boundaries that receive flood control benefits. Assessment factors are based on agricultural, residential, and commercial/industrial land use categories. Other land types, such as open space under State and Federal ownership, are not included in the tax revenues. District revenues for FY 2007 to 2008 were $930,000 (Merced County Local Agency Formation Commission 2009). Expenditures reported by the district are listed in Table 21-13.

Table 21-13.
Lower San Joaquin Levee District Maintenance Costs

Fiscal Year	Total Maintenance Costs, Expenditures
2007-2008	$871,000
2009-2010	$943,303
2010-2011	$983,649
2011-2012	$964,532
2012-2013	$1,038,960
2013-2014	$977,458[a]

Source: Merced County Local Agency Formation Commission 2009; DWR 2010, 2011, 2012, 2013

Notes:

[a] Projected value.

The San Joaquin River Restoration Program (SJRRP) has pursued a financial assistance agreement with the LSJLD intended to assist the district in adapting to changes in operations and maintenance activities such that the existing level of flood management is maintained during release of Interim and Restoration flows. Management activities may include controlling potential erosion and levee underseepage, control of vegetation, operation of flood control structures, removal of sediment, or other changes needed to maintain the functionality of the system. Financial assistance estimates for FY 2013 to 2015 range from $260,000 to $300,000 (SJRRP 2013).

21.2 Regulatory Setting

The assessment of socioeconomic resources is guided primarily by Federal laws and policies. State and local laws and policies typically guide economic development and diversity, environmental justice, public health and safety, housing, and other concerns of residents within State and local jurisdictions.

21.2.1 Federal

The major Federal law and regulation guiding the assessment of socioeconomic resources is NEPA. The Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500–1508) provide guidance related to social and economic impact assessment by noting that the "human environment" assessed under NEPA is to be "interpreted comprehensively" to include "the natural and physical environment and the relationship of people with that environment" (40 CFR 1508.14). Furthermore, these regulations require agencies to assess "aesthetic, historic, cultural, economic, social, or health" effects, whether direct, indirect, or cumulative (40 CFR 1508.8).

21.2.2 State of California

There are no specific State laws and regulations applicable to socioeconomic resources. In the context of CEQA, economic effects are not considered significant effects on the environment (see § 15131 of the State CEQA Guidelines). State CEQA Guidelines section 15131, subdivision (a) notes that the chain of cause/effect from economic to environmental impacts can be traced. In addition, section 15131, subdivision (b) states that economics can be used to determine significance of environmental impacts.

21.2.3 Regional and Local

Generally, local governments address economic development broadly through general plans, economic development strategies, and as part of project reviews. Through these types of efforts, many local jurisdictions maintain policies intended to protect and expand local and regional economies to benefit local communities and residents, while minimizing adverse environmental effects.

21.3 Environmental Consequences and Mitigation Measures

21.3.1 Impact Assessment Methodology

Socioeconomics and Economics

This section describes the approach for evaluating effects on socioeconomic resources and the economy. The Project may have several types of economic impacts, including:

- Short-term construction spending and use of local labor from the Project area.
- Ongoing operation and maintenance expenditures.
- Loss of agricultural production values (revenues) based on permanently-idled cropland.

- Regional economic impacts (measured by output, income, and jobs) associated with local spending and changes in agricultural production, including indirect impacts on agricultural-support industries.
- Loss of tax revenue to local agencies and local jurisdictions from shift in land ownership patterns from private to public.

Initial Construction and Ongoing Operations and Maintenance Costs

The costs for Project construction and ongoing operation, maintenance, and repair activities have been evaluated to determine socioeconomic impacts in the Project area. Project construction includes purchases of goods and services, hiring of labor, and other activities. Similarly, the Project would require long-term expenditures for ongoing operations and maintenance activities. These direct effects would generate regional economic benefits across a range of support industries. Construction and operations and maintenance spending are based on cost estimates developed for the Project.

Loss of Agricultural Production Values based on Permanently-Idled Cropland

The physical impacts on agricultural operations and the effects on existing crop production in the Project area are discussed in Chapter 16, "Land Use Planning and Agricultural Resources." That information was utilized in conjunction with data on crop yields and prices to estimate changes in agricultural revenues. Information on crop yields and prices have been obtained from county agricultural commissioner reports.

Loss of Agricultural Production Values based on Seepage Impacts to Remaining Cropland

The potential for seepage and high water table impacts are discussed in Chapter 13, "Hydrology – Groundwater." This information has been reviewed to determine if agricultural lands not proposed to be removed from production could be affected from high groundwater levels. The impact on crop yields and production values of these lands that would remain in production are evaluated qualitatively.

Regional Economic Impacts

Regional economic impacts would be generated by construction and operations and maintenance spending and changes in agricultural production. Information on construction and operations and maintenance spending has been reviewed to determine the extent of local purchases and use of local labor anticipated under the Project. These direct effects have been used as inputs through a regional economic model to estimate the indirect and induced effects of Project-related spending based on inter-industry linkages. In addition, regional effects from changes in agricultural production have been evaluated. Agriculture is a goods-producing industry that affects and is affected by many other industries in a local area. As crop acreage expands or contracts, so does the purchases of such inputs as seed, chemicals, fertilizers, and machinery. As these related industries are affected, they change their purchases of goods and services required in their respective operations. Collectively, these transactions reflect the total economic impact associated with changes in agricultural production, which extends beyond the farm level.

The regional economic impacts from project spending and changes in agricultural production have been assessed using an input-output (I-O) model of the Fresno and Madera County region. I-O analysis is a means of measuring the flow of commodities and services among industries, institutions, and final consumers within an economy. An I-O model captures all monetary market transactions for consumption in a given time period accounting for inter-industry linkages and availability of regionally produced goods and services.

The primary input variable for I-O analysis is the dollar change in purchases of products or services for final use – this is referred to as "final demand." Final demand changes drive I-O models. Industries respond to meet demands directly or indirectly (by supplying goods and services to industries responding directly to final demand changes). The primary output variables are predicted changes in direct, indirect, and induced output, employment, and income effects[2] for the affected industries within a defined study area. The measurement of direct, indirect, and induced linkages within a regional economy is based on the concept of a multiplier. A multiplier is a single number that quantifies the total economic effect resulting from direct effects. Several types of multipliers are produced by an I-O model, including output, employment, and income multipliers.

For the purposes of this analysis, the Impact Analysis for Planning (IMPLAN) model has been used to perform the I-O analysis. IMPLAN is a computer-driven system of software and data commonly used to perform regional economic impact analysis. National technical relationships among industries form the basis for the model. A two-county model was developed for this analysis covering Fresno and Madera counties based on the 2010 IMPLAN dataset.

Fiscal Effects on Local Jurisdictions

Potential fiscal impacts of the Project are based on changes in land ownership patterns that would remove lands from property tax rolls and reduce property tax revenues realized by local jurisdictions. Assumptions were made relative to the assessed values of properties in the Project area and applicable property tax rates were collected to determine the extent of property tax impacts based on the assumption that all land within the Project footprint would be transferred into public ownership. This represents a worst-case scenario as easements may be purchased on some lands.

Population and Housing

This section describes the approach for the analysis of impacts on population and housing in the Project area, which is both qualitative and quantitative in nature. The socioeconomic impacts of the Project, including changes in employment, have been evaluated to determine if the Project would induce population growth in the region in the short term (associated with the construction workforce) and/or long term (associated with changes in regional economic conditions). Expected changes in population and available

[2] **Direct** effects represent the impacts for the expenditures and/or production values specified as direct final demand changes. **Indirect** effects represent the impacts caused by the iteration of industries purchasing from industries resulting from the direct final demand changes. **Induced** effects represent the impacts on all local industries caused by the expenditures of new household income generated by the direct and indirect effects resulting from the direct final demand changes.

housing stock in the region have been evaluated to determine if there are sufficient housing resources to meet the needs of the project and/or if population out-migration would lead to an over-supply of housing stock in the region.

21.3.2 Significance Criteria

Economic and Social Effects

Section 15131 of the State CEQA Guidelines states that economic and social effects of a project are not significant environmental effects; however, they may be used to determine the significance of physical changes caused by a project. Further explained, a project may result in physical environmental changes and the economic or social effects of the project on the community may be used to determine whether the physical changes would be significant. Under CEQA, determining the significance of economic impacts is not required. On the other hand, NEPA requires analysis of social and economic impacts; however, there are no standard significance criteria for socioeconomic impacts under NEPA. Accordingly, no formal thresholds of significance for economics exist, although such criteria can be developed on a project-by-project basis. For the purpose of this analysis, the magnitude of potential effects on socioeconomic conditions are determined to be "substantial" or "less than substantial." For this analysis, the Project would result in a substantial impact on socioeconomic conditions in the Project area if it would result in a substantial decrease in:

- The value of agricultural production relative to region-wide conditions.
- Regional employment and/or income levels relative to region-wide conditions.
- Property tax revenues relative to region-wide conditions.

Population and Housing

The Project is evaluated in accordance with the population and housing section of Appendix G of the CEQA Environmental Checklist. Under NEPA CEQ Regulations, effects must be evaluated in terms of their context and intensity. These factors have been considered when applying State CEQA Guidelines Appendix G. The Project would result in a significant impact on population and housing if it would do any of the following:

- Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).
- Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere.
- Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

21.3.3 Impacts and Mitigation Measures

This section provides a project-level evaluation of direct and indirect effects of the Project alternatives on socioeconomic conditions in the Project area. It includes analyses of potential effects relative to No-Action conditions in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. The

analysis is organized by Project alternative with specific impact topics numbered sequentially under each alternative. With respect to socioeconomics, the relevant issues and concerns are:

1. Change in Agricultural Production Values.
2. Effects on the Regional Economy from Changes in Agricultural Production.
3. Effects on the Regional Economy from Construction and Operations and Maintenance Spending.
4. Effects on Local Tax Revenues.
5. Change in Population Growth and Housing Demand.
6. Losses to the Lower San Joaquin Valley Levee District.

There are other socioeconomic-related issues covered in the Program Environmental Impact Statement/Report (PEIS/R) that are not covered here because they are programmatic in nature and/or are not relevant to the Project area. Not covered here are effects related to physical decay of communities.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B. Nevertheless, other proposed actions under the SJRRP would be implemented, including habitat restoration in other reaches, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these activities would not achieve the Settlement goals. The potential effects of the No-Action Alternative are described below. The analysis of the No-Action Alternative is based on a comparison to existing conditions. No mitigation is required for No-Action.

Impact ECON-1 (No-Action Alternative): *Change in Agricultural Production Values*. Under the No-Action Alternative, agricultural production in the Project area would continue similar to existing conditions, and no land would be taken out of production by the Project. There is the potential that Restoration Flows in the Project area would result in groundwater seepage that could diminish the agricultural productivity or result in crop damages on agricultural land in Reach 2B; however, Restoration Flows would be restricted in order to minimize seepage impacts (refer to Chapter 13, "Hydrology – Groundwater" for more details on potential seepage impacts). As a result, the value of agricultural production in the Project could decline under the No-Action Alternative. However, flow through Reach 2B would be managed by Program actions under the No-Action Alternative to minimize seepage impacts in Reach 2B. The maximum conveyance would be limited to the existing channel capacity by diverting excess flow through the Chowchilla Bypass. Therefore the magnitude of potential agricultural production losses under the No-Action alternative would be minor and this is considered **less than substantial** impact compared to existing conditions.

Impact ECON-2 (No-Action Alternative): *Effects on the Regional Economy from Changes in Agricultural Production*. As described under Impact ECON-1 (No-Action Alternative), the potential impact on agricultural production values due to groundwater

seepage is expected to be minor. To the extent that productivity declines could remove land from production and result in reduced crop production over the long-term, there could be a decrease in regional economic activity as farm-level expenditures in the local economy decline. This could result in a decline in economic output, income, and employment in the regional economy covering Fresno and Madera counties. However, potential seepage impacts on agricultural production values are expected to be minor and the extent of agricultural production in the Project area is comparatively minor (less than 0.2 percent) when evaluated in the context of the agricultural production in the two-county region; therefore, effects on the regional economy would likely be minor. This impact is considered **less than substantial** compared to existing conditions.

Impact ECON-3 (No-Action Alternative): *Effects on the Regional Economy from Construction and Operations and Maintenance Spending*. There would be no expenditures on construction and operations and maintenance activities under the No-Action Alternative; therefore, there would be no benefits accruing to the regional economy. **No impact** would occur compared to existing conditions.

Impact ECON-4 (No-Action Alternative): *Effects on Local Tax Revenues*. Under the No-Action Alternative, there would be no land acquisition in the Project area; therefore, there would be no change in ownership patterns and all privately-owned properties would remain privately-owned. As a result, there would be no change county-wide property tax rolls and property tax revenues accruing to Fresno and Madera counties would not change. In addition, there would be no change in local sales tax revenues because there would be no project-level expenditures occurring within the local economy. Overall, there would be **no impact** on local tax revenues under the No-Action Alternative compared to existing conditions.

Impact ECON-5 (No-Action Alternative): *Change in Population Growth and Housing Demand*. Under the No-Action Alternative, there would be no new facilities developed in the Project area that would displace people or housing. In addition, without the Project, there would be no new economic activity that would support population growth or new housing demand. **No impact** would occur compared to existing conditions.

Impact ECON-6 (No-Action Alternative): *Losses to the Lower San Joaquin Levee District.* Under the No-Action Alternative, no levee or channel improvements would be made by the Project and flows would be confined within the existing levee alignment. Restoration Flows may result in increased operation and maintenance costs for LSJLD due to increased vegetation management and sediment management activities. However, SJRRP has pursued a financial assistance agreement with the LSJLD to assist the district in adapting to changes in operations and maintenance activities to maintain existing levels of flood protection during release of Restoration Flows. Therefore, this impact would be **less than substantial**.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

All of the Project alternatives, including Alternative A, entail land acquisition, construction and operation of new Project facilities, and implementation of habitat

restoration activities that could affect socioeconomic conditions in the Project area and the larger regional economy.

Impact ECON-1 (Alternative A): *Change in Agricultural Production Values*. Compared to No-Action, Alternative A would permanently remove approximately 1,180 acres of agricultural land from production, temporarily displace 60 acres of agricultural production during construction, and shift agricultural uses to pasture (livestock grazing) on another 580 acres within the proposed floodplain; refer to Impact LU-1 (Alternative A) for more details. The farm gate value[3] of commodities produced on lands that would be removed from production is estimated at $6.4 million annually, representing about 38 percent of the total value of agricultural production in the Project area (see Table 21-14). There would be an additional $230,000 in crop losses annually during the construction timeframe due to temporary displacement of agricultural production. The direct economic effect on agricultural landowners in the Project area would be negligible because privately-owned farmland would be purchased from landowners at fair market value, which is generally based on revenue potential for agricultural properties. At the regional level, the decline in agricultural production values is minor (less than 0.08 percent) when compared to agricultural activity in Fresno and Madera counties, which was valued at $8.5 billion in 2011.

When comparing Alternative A to existing conditions, impacts on the value of agricultural production would be similar to those described in the preceding paragraph (i.e., the comparison of Alternative A to No-Action). In summary, the Project would remove land from agricultural production and diminish the value of agricultural commodities produced in the Project area. Because the decline in agricultural values is small relative to production values in the region (less than 0.08 percent), this impact is considered **less than substantial**.

Table 21-14.
Annual Change in Agricultural Production Values

Type of Agricultural Effect	Change in Agricultural Production Values, Annual (millions)[a]			
	Alt. A	Alt. B	Alt. C	Alt. D
Permanent Agricultural Loss [b]	-$6.4	-$7.4	-$5.8	-$8.8
Temporary Agricultural Loss [c]	-$0.2	-$0.2	-$0.3	-$0.3
Total	-$6.6	-$7.6	-$6.0	-$9.1

Notes:

[a] Values reported in constant 2010 dollars

[b] Represents net effect of crop production losses and new grazing activity under Alternatives A, B, and D

[c] Temporary annual losses corresponding to construction timeframe

[3] The farm gate value is the value of the product when it leaves the farm, which does not include other costs incurred at the retail level such as shipping, handling, storage, marketing, and profit of the other involved companies.

Impact ECON-2 (Alternative A): ***Effects on the Regional Economy from Changes in Agricultural Production***. Compared to No-Action, Alternative A would take agricultural land out of agricultural production, which would have "ripple" (or multiplier) effects on the local economy based on inter-industry linkages between the agricultural sector and other sectors of the economy. The regional economic impacts associated with permanent and temporary changes in agricultural production are presented in Table 21-15.

Table 21-15.
Regional Economic Effects, Agricultural Production

Alternative	Output (millions)		Labor Income (millions)		Employment	
	Direct	Total	Direct	Total	Direct	Total
Permanent						
Alternative A	-$6.4	-$10.1	-$1.8	-$3.1	-40	-75
Alternative B	-$7.4	-$11.6	-$2.1	-$3.5	-46	-85
Alternative C	-$5.8	-$9.1	-$1.7	-$2.7	-37	-67
Alternative D	-$8.8	-$14.0	-$2.6	-$4.3	-56	-103
Temporary						
Alternative A	-$0.2	-$0.4	-$0.1	-$0.1	-1	-2
Alternative B	-$0.2	-$0.4	-$0.1	-$0.1	-1	-2
Alternative C	-$0.3	-$0.4	-$0.1	-$0.1	-2	-3
Alternative D	-$0.3	-$0.4	-$0.1	-$0.1	-1	-3

Notes:

[a] Values represent average annual effects over the long term in the two-county region (Fresno and Madera counties) based on IMPLAN modeling.

[b] Values reported in constant 2010 dollars

Similar to all of the Project alternatives, Alternative A would have a long-term adverse effect on the regional economy due to permanent losses in agricultural production and related spending. The direct effects at the farm level include annual losses of $6.4 million in economic output (or agricultural production value), $1.8 million in labor income, and 40 jobs. The total economic impacts (incorporating ripple effects in the regional economy) include annual losses of $10.1 million in output, $3.1 million in labor income, and 75 jobs in the two-county economy compared to No-Action; these effects are minor when considered in the context of the total economic activity in the regional economy (e.g., annual output losses are less than 0.12 percent of regional agricultural production alone). Temporary effects in the regional economy from changes in agricultural production during construction would be relatively small (e.g., annual output losses are less than 0.005 percent of the regional agricultural production).

When comparing Alternative A to existing conditions, impacts on the regional economy would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). In summary, the Project would cause a decline in economic production, labor income, and jobs in Fresno and Madera counties. Because these adverse

effects in the regional economy are small relative to total economic activity in the region, this impact is considered **less than substantial**.

Impact ECON-3 (Alternative A): *Effects on the Regional Economy from Construction and Operations and Maintenance Spending*. Compared to No-Action, implementation of the Project would entail short-term construction and long-term operations and maintenance activities in the Project area, which would generate benefits within the local economy. These economic effects include both the direct benefits attributed to construction expenditures and workforce requirements within the Project area, but also capture the "ripple" (or multiplier) effects across the larger economy. The regional economic impacts associated with construction and operations and maintenance activities associated with the Project are presented in Table 21-16.

Construction of the Project would require substantial expenditures for capital equipment, construction-related goods and services, and labor. These expenditures would generate local economic activity, as measured by changes in economic output, labor income and employment, over the approximate 11-year construction period. Under Alternative A, the total cost of the Project is estimated at $517.3 million. Of that total, construction spending on goods/services and major equipment accounts for approximately $364.4 million, $123.2 million is attributed to construction labor payroll, and land acquisition costs represent the remaining $29.7 million. The direct output value of Project construction over the 10-year construction period is $487.6 million (or $44.3 million annually), which excludes land acquisition costs that are not reflective of the value of the Project.[4] Project construction would also directly support, on average, up to approximately 100 jobs annually with a corresponding payroll of $11.2 million per year; these direct construction benefits would accrue to both local and non-local workers.

To the extent that construction expenditures are made locally, construction of the Project would generate additional economic benefits in Fresno and Madera counties.[5] When considering indirect and induced effects due to inter-industry linkages and labor income spending that is expected to occur locally, Alternative A would generate an additional $23.7 million in economic output, $8.5 million in labor income, and support another 193 jobs in the local economy on an annual basis. Overall, the total economic benefits of the Project include $68.0 million in output, $19.7 million in labor income, and 293 jobs annually in the local economy under Alternative A. These construction effects would be temporary, however, lasting only over the construction period.

[4] Land acquisition represents an exchange of assets between the buyer and seller, which does not generate any further economic effects. There may be some ancillary economic benefits associated with the land acquisition process, such as expenditures on real estate and legal fees; however, these costs have not been quantified and are excluded from the analysis.

[5] A portion of construction expenditures would be made outside of Fresno and Madera counties, including spending on specialized equipment that is not manufactured locally. Because these products are not produced and/or sold locally, no additional economic activity in the two-county region is generated by these expenditures.

Table 21-16.
Regional Economic Effects, Construction and Operations

Alternative	Output (millions)		Labor Income (millions)		Employment	
	Direct	Total	Direct	Total	Direct	Total
Construction						
Alternative A	$44.3	$68.0	$11.2	$19.7	100	293
Alternative B	$34.1	$51.7	$9.8	$16.1	100	244
Alternative C	$42.0	$65.0	$9.8	$18.1	99	287
Alternative D	$35.7	$55.0	$8.8	$15.8	100	258
Operations and Maintenance						
Alternative A	$1.7	$3.0	$0.3	$0.7	4	14
Alternative B	$1.2	$2.1	$0.3	$0.6	4	12
Alternative C	$1.1	$1.9	$0.3	$0.6	4	11
Alternative D	$1.1	$1.9	$0.3	$0.6	4	11

Notes:
[a] Values represent average annual effects over the long term in the two-county region (Fresno and Madera counties) based on IMPLAN modeling
[b] Values reported in constant 2010 dollars

In addition, ongoing Project operations would generate long-term economic benefits to the region. Conceptually, the direct output value attributed to Project operations and maintenance reflects the costs of intermediate goods and services and value added. Under Alternative A, Project operations and maintenance would generate a demand for nearly $1.5 million in ongoing expenditures on goods and services, some of which would be supplied by local industries. In addition, the operations and maintenance budget includes approximately $253,000 in labor payroll that would support roughly four jobs. The total operations and maintenance budget for the Project under Alternative A would be $1.7 million annually; this represents the direct output value of Project operations and maintenance, which drives additional economic activity in the region. When considering indirect and induced effects of money filtering through the local economy, the Project would generate an estimated $3.0 million in total economic output, $705,000 in total labor income, and over 14 total jobs annually. The benefits associated with Project operations and maintenance would be long term, extending over the life of the Project.

When comparing Alternative A to existing conditions, construction and operations and maintenance of the Project would result in similar effects on the regional economy as those described in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). In summary, the Project would generate new economic activity, namely increases in economic production, labor income, and jobs in Fresno and Madera counties over both the short and long term and this would be a **beneficial** effect.

Impact ECON-4 (Alternative A): ***Effects on Local Tax Revenues***. Compared to No-Action, Alternative A would involve a shift in land ownership patterns in the Project area,

namely privately-owned lands being acquired and placed into public ownership. Such a shift in land ownership would remove land from property tax rolls maintained by Fresno and Madera counties, thereby resulting in a reduction in property tax revenues realized by these two counties. The assessed value and tax liability of properties in the Project area are unknown;[6] therefore, it is not possible to precisely calculate losses in property tax revenues accruing to Fresno and Madera counties, but a range of estimated losses are provided below for comparative purposes.

Under Alternative A, the fair market value of land within the Project area is estimated at approximately $53.8 million, and roughly 90 percent of the land area is in private ownership. This estimate is based on agricultural land values in the region and excludes the value of any structures or contiguous land outside the Project footprint. Assuming that the assessed value of land is equivalent to fair market value and the applicable property tax rate is 1 percent,[7] implementation of Alternative A would result in the loss of up to $482,000 in annual property tax revenues. However, the assessed value of land is typically lower than fair market value based on provisions of Proposition 13 and other tax exemptions. It has been estimated that Fresno and Madera counties collect approximately 0.65 percent and 0.59 percent, respectively, of a property's fair market value in property taxes (). Based on these figures, property tax losses are an estimated $323,000 annually. Reductions in property tax revenues could affect the counties' ability to provide key public services to local residents. However, the estimated decline in property tax revenues, ranging from $323,000 to $482,000 annually, accounts for less than 0.2 percent of the total combined property tax revenue in the two counties, nearly $216 million in FY 2010-11.

When comparing Alternative A to existing conditions, impacts on property tax revenues would be similar to those described in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). In summary, the Project would shift land from private to public ownership, thereby removing land from property tax rolls and reducing the property tax revenues accruing to Fresno and Madera counties. Because the potential loss in property tax revenues is minor compared to property tax revenues generated in the region (less than 0.2 percent), this impact is considered **less than substantial**.

Impact ECON-5 (Alternative A): *Change in Population Growth and Housing Demand*. Compared to No-Action, Alternative A would displace some local residents from the Project area as private land is acquired to implement the Reach 2B Project. Although not all of the land within the Project area would be subject to habitat restoration or facility development, it is assumed that all land within the Project area would be acquired and transferred into public ownership. Approximately two homes would be impacted within the Project area, but because the area is relatively rural and predominantly in agricultural production, the extent of population and housing displacement would not be substantial relative to existing population levels and housing

[6] The assessed value of agricultural land is also affected by Williamson Act contracts on properties in the Project area. In these cases, property taxes paid by private landowners are reduced, but counties may be eligible for subvention payments from the state to compensate for property tax losses.

[7] The base property tax rate in California is 1 percent of assessed value. Property tax rates also commonly include special assessments and other levies that bring the tax rate to greater than 1 percent.

stock in Fresno and Madera counties. Accordingly, the Project would not necessitate the construction of replacement housing elsewhere in the region based on direct displacement of local residents.

There could, however, be an increase in the demand for temporary housing, such as hotels, motels and apartments, during Project construction. It is estimated that Project construction under all of the Project alternatives would require about 100 direct workers. The extent of the construction workforce that would come from within the local region is unknown; however, it is anticipated that many workers would be based within the local area and housing would not be required. However, some non-local workers would travel from outside the region to work on the Project and utilize local temporary housing resources. There is a multitude of temporary housing resources in Fresno and Madera counties, which would likely have sufficient capacity to accommodate the construction workforce required for this Project. In addition, based on the regional economic modeling conducted for the Project, another 158 to 194 jobs (depending on alternative) would be created in the local economy over the construction timeframe; these new jobs are expected primarily in agricultural and service industries and likely filled by local residents that would not require new housing. During operations, the Project would also require about four long-term employees, which are expected to reside permanently in the local area. The potential increases in housing demand outlined above would be offset to some degree by declines in agricultural employment at the farm level and in support industries in the local economy that may reduce the demand for local housing.

When comparing Alternative A to existing conditions, impacts on population growth and housing demand would be similar to those described in the preceding paragraphs (i.e., comparison of Alternative A to No-Action). In summary, the Project would likely result in a limited increase in housing demand during construction, which would be accommodated by local housing resource; no long-term housing effects are anticipated. This impact is considered **less than significant**.

Impact ECON-6 (Alternative A): ***Losses to the Lower San Joaquin Levee District.*** Similar to the No-Action Alternative, Restoration Flows may result in increased operation and maintenance costs for LSJLD due to increased vegetation management and sediment management activities at Project facilities. However, SJRRP has pursued a financial assistance agreement with the LSJLD on a Program-level to assist the district in adapting to changes in operations and maintenance activities, including changes in Reach 2B, such that existing levels of flood management are maintained during release of Restoration Flows.

Alternative A would permanently remove approximately 1,180 acres of agricultural land from production, temporarily displace 60 acres of agricultural production during construction, and shift agricultural uses to pasture (livestock grazing) on another 580 acres within the proposed floodplain. The permanent loss of agricultural lands would reduce LSJLD's tax revenues by about $6,600 to $9,300; however, this reduction is small (less than 1 percent) relative to total revenues for the district.

When comparing Alternative A to existing conditions, impacts would be similar to those described in the preceding paragraphs (i.e., comparison of Alternative A to No-Action). Because increased operations and maintenance costs are accounted for by Program-level actions and because the permanent loss of agricultural lands would cause a relatively small reduction in the district's tax revenues (less than 1 percent) relative to total tax revenues, this impact is considered **less than substantial**.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

All of the Project alternatives, including Alternative B, would entail land acquisition, construction and operations and maintenance of new Project facilities, and implementation of habitat restoration activities that could affect socioeconomic conditions in the Project area and the larger regional economy.

Impact ECON-1 (Alternative B): ***Change in Agricultural Production Values***. Under Alternative B, there would be a permanent removal of approximately 1,032 acres of agricultural land from production, temporary displacement of another 42 acres of agricultural production during construction and shift in agricultural uses on another 886 acres within the proposed floodplain; refer to Impact AG-LU-1 (Alternative B) for more details. The farm gate value of commodities produced on lands permanently taken out of production would be nearly $7.4 million annually, representing about 44 percent of the total value of agricultural production in the Project area (see Table 21-14). There would be an additional $200,000 in annual crop losses during the construction timeframe due to temporary displacement of agricultural production. The direct economic effect on farmers would be negligible because privately-owned farmland would be purchased and property owners compensated at fair market value for their land, which is generally based on revenue potential for agricultural properties. At the regional level, the decline in agricultural production values is minor (less than 0.1 percent) when compared to agricultural activity in Fresno and Madera counties, which was valued at $8.5 billion in 2011.

When comparing Alternative B to existing conditions, impacts on the value of agricultural production would be similar to those described in the preceding paragraph (i.e., comparison of Alternative B to No-Action). In summary, the Project would remove land from agricultural production and diminish the value of agricultural commodities produced in the Project area. Because the decline in agricultural values is small relative to production values in the region (less than 0.1 percent), this impact is considered **less than substantial**.

Impact ECON-2 (Alternative B): ***Effects on the Regional Economy from Changes in Agricultural Production***. Under Alternative B, effects on the regional economy from changes in agricultural production would be similar to those described under Alternative A; refer to Impact ECON-2 (Alternative A) above. The regional economic impacts associated with permanent and temporary changes in agricultural production are presented above in Table 21-15. Compared to No-Action Alternative B would have a long-term adverse effect on the regional economy due to permanent losses in agricultural production and related spending. Specifically, the direct effects at the farm level include

annual losses of nearly $7.4 million in economic output (or agricultural production value), $2.1 million in labor income, and 46 jobs. The total economic impacts (incorporating ripple effects in the regional economy) include annual losses of $11.6 million in output, $3.5 million in labor income, and 85 jobs in the two-county economy compared to No-Action; these effects are minor when considered in the context of the total economic activity supported throughout the regional economy (e.g., annual output losses are less than 0.15 percent of regional agricultural production alone). Temporary effects in the regional economy from changes in agricultural production during construction would be relatively small (e.g., annual output losses are less than 0.005 percent of the regional agricultural production).

When comparing Alternative B to existing conditions, impacts on the regional economy from reduced agricultural production would be similar to those described in the preceding paragraph (i.e., comparison of Alternative B to No-Action). In summary, the Project would cause a decline in economic production, labor income, and jobs in Fresno and Madera counties. Because these adverse effects in the regional economy are small relative to total economic activity in the region, this impact is considered **less than substantial**.

Impact ECON-3 (Alternative B): ***Effects on the Regional Economy from Construction and Operations and Maintenance Spending***. Compared to No-Action, implementation of Alternative B would generate regional economic benefits to Fresno and Madera counties during construction and operations and maintenance, which are presented above in Table 21-16; refer to Impact ECON-3 (Alternative A) for more details.

In summary, the total cost of the Project under Alternative B is estimated at $480.0 million over the approximate 13-year construction period. The direct economic benefits of Project construction include $34.1 million in economic output, $9.8 million in labor income, and approximately 100 jobs annually. Accounting for the “ripple” (or multiplier) effects in the regional economy, the annual construction benefits of the Reach 2B project under Alternative B total $51.7 million in economic output, $16.1 million in labor income, and 244 jobs throughout the local economy. These construction effects would be temporary, however, lasting only over the construction period.

Project operations and maintenance would also generate long-term economic benefits to the region. Under Alternative B, the total operations and maintenance budget is approximately $1.2 million (corresponding to the direct output value of Project operations), which includes $963,000 for expenditures on goods and services and $278,000 in labor payroll that would support roughly four jobs. When considering the additional economic activity supported by these expenditures, Alternative B would generate an estimated $2.1 million in total economic output, $600,000 in total labor income, and nearly 12 total jobs annually. The benefits associated with Project operations and maintenance would be long term, extending over the life of the Project.

When comparing Alternative B to existing conditions, effects on the regional economy from construction and operations and maintenance of the Project would be similar to those described in the preceding paragraphs (i.e., comparison of Alternative B to No-

Action). In summary, the Project would generate new economic activity, namely increases in economic production, labor income, and jobs in Fresno and Madera counties over both the short and long term and this would be a **beneficial** effect.

Impact ECON-4 (Alternative B): ***Effects on Local Tax Revenues***. Under Alternative B, effects on local tax revenues would be similar to those described under Alternative A; refer to Impact ECON-4 (Alternative A) for more details. Compared to No-Action, it is estimated that Alternative B may result in a reduction in property tax revenues ranging between $322,000 and $483,000 annually, which accounts for less than 0.3 percent of the total combined property tax revenues collected in Fresno and Madera counties.

When comparing Alternative B to existing conditions, impacts on property tax revenues would be similar to those described in the preceding paragraph (i.e., comparison of Alternative B to No-Action). In summary, the Project would shift land from private to public ownership, thereby removing land from property tax rolls and reducing the property tax revenues accruing to Fresno and Madera counties. Because the potential loss in property tax revenues is minor compared to property tax revenues generated in the region (less than 0.3 percent), this impact is considered **less than substantial**.

Impact ECON-5 (Alternative B): ***Change in Population Growth and Housing Demand***. Under Alternative B, effects on population growth and housing demand would be similar as those described under Alternative A; refer to Impact ECON-5 (Alternative A) for more details. Compared to existing conditions, Alternative B would likely result in a limited increase in housing demand during construction, which would be accommodated by local housing resources; no long-term housing effects are anticipated. This impact is considered **less than significant**.

Impact ECON-6 (Alternative B): ***Losses to the Lower San Joaquin Levee District.*** Refer to Impact ECON-6 (Alternative A). Potential impacts of Alternative B are similar to potential impacts of Alternative A. Under Alternative B, there would be a permanent removal of approximately 2,032 acres of agricultural land from production and temporary displacement of another 56 acres of agricultural production during construction. Although this would cause a reduction in the LSJLD's tax revenues, the amount of revenues lost would be small (less than 1 percent) compared to total revenues. This impact would be **less than substantial**.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

All of the Project alternatives, including Alternative C, would entail land acquisition, construction and operations and maintenance of new Project facilities, and implementation of habitat restoration activities that could affect socioeconomic conditions in the Project area and the larger regional economy.

Impact ECON-1 (Alternative C): ***Change in Agricultural Production Values***. Under Alternative C, there would be a permanent loss of about 1,516 acres of agricultural land from production and temporary displacement of another 73 acres of agricultural production during construction; refer to Impact AG-LU-1 (Alternative C) for more details. The farm gate value of commodities produced on lands permanently taken out of

production would be approximately $5.8 million annually, representing about 34 percent of the total value of agricultural production in the Project area (see Table 21-14). There would be an additional $268,000 in annual crop losses during the construction timeframe due to temporary displacement of agricultural production. The direct economic effect on farmers would be negligible because privately-owned farmland would be purchased and property owners compensated at fair market value for their land, which is generally based on revenue potential for agricultural properties. At the regional level, the decline in agricultural production values is minor (less than 0.07 percent) when compared to agricultural activity in Fresno and Madera counties, which was valued at $8.5 billion in 2011.

When comparing Alternative C to existing conditions, impacts on the value of agricultural production would be similar to those described in the preceding paragraph (i.e., comparison of Alternative C to No-Action). In summary, the Project would remove land from agricultural production and diminish the value of agricultural commodities produced in the Project area. Because the decline in agricultural values is small relative to production values in the region (less than 0.07 percent), this impact is considered **less than substantial**.

Impact ECON-2 (Alternative C): ***Effects on the Regional Economy from Changes in Agricultural Production***. Under Alternative C, effects on the regional economy from changes in agricultural production would be similar to those described under Alternative A; refer to Impact ECON-2 (Alternative A) for more details. The regional economic impacts associated with permanent and temporary changes in agricultural production are presented above in Table 21-15. Compared to No-Action Alternative C would have a long-term adverse effect on the regional economy due to permanent losses in agricultural production and related spending. Specifically, the direct effects at the farm level include annual losses of $5.8 million in economic output (or agricultural production value), $1.7 million in labor income, and 37 jobs. The total economic impacts (incorporating ripple effects in the regional economy) include annual losses of $9.1 million in output, $2.7 million in labor income, and 67 jobs in the two-county economy compared to No-Action; these effects are minor when considered in the context of the total economic activity supported throughout the regional economy (e.g., annual output losses are less than 0.11 percent of regional agricultural production alone). Temporary effects in the regional economy from changes in agricultural production during construction would be relatively small (e.g., annual output losses are less than 0.005 percent of the regional agricultural production).

When comparing Alternative C to existing conditions, impacts on the regional economy as a result of decreased agricultural production would be similar to those described in the preceding paragraph (i.e., comparison of Alternative C to No-Action). In summary, the Project would cause a decline in economic production, labor income, and jobs in Fresno and Madera counties. Because these adverse effects in the regional economy are small relative to total economic activity in the region, this impact is considered **less than substantial**.

Impact ECON-3 (Alternative C): *Effects on the Regional Economy from Construction and Operations and Maintenance Spending*. Compared to No-Action, implementation of Alternative C would generate regional economic benefits to Fresno and Madera counties during construction and operations and maintenance, which are presented above in Table 21-16; refer to Impact ECON-3 (Alternative A) for more details.

In summary, the total cost of the Project under Alternative C is estimated at $490.2 million over the approximate 11-year construction period. The direct economic benefits of Project construction include $42.0 million in economic output, $9.8 million in labor income, and approximately 99 jobs annually. Accounting for the "ripple" (or multiplier) effects in the regional economy, the annual construction benefits of the Reach 2B project under Alternative C total $65.0 million in output, $18.1 million in labor income, and 287 jobs throughout the local economy. These construction effects would be temporary, however, lasting only over the construction period.

Project operations and maintenance would also generate long-term economic benefits to the region. Under Alternative C, the total operations and maintenance budget is approximately $1.1 million (corresponding to the direct output value of Project operations), which includes $829,000 for expenditures on goods and services and $271,000 in labor payroll that would support roughly four jobs. When considering the additional economic activity supported by these expenditures, Alternative C would generate an estimated $1.9 million in total economic output, $557,000 in total labor income, and about 11 total jobs annually. The benefits associated with Project operations and maintenance would be long term, extending over the life of the Project.

When comparing Alternative C to existing conditions, effects on the regional economy as a result of construction and operations and maintenance of the Project would be similar to those described in the preceding paragraphs (i.e., comparison of Alternative C to No-Action). In summary, the Project would generate new economic activity, namely increases in economic production, labor income, and jobs in Fresno and Madera counties over both the short and long term and this would be a **beneficial** effect.

Impact ECON-4 (Alternative C): *Effects on Local Tax Revenues*. Under Alternative C, effects on local tax revenues would be similar to those described under Alternative A; refer to Impact ECON-4 (Alternative A) for more details. Compared to No-Action, it is estimated that Alternative C would result in a reduction in property tax revenues ranging between $322,000 and $478,000 annually, which accounts for less than 0.2 percent of the total combined property tax revenue collected in Fresno and Madera counties.

When comparing Alternative C to existing conditions, impacts on property tax revenues would be similar to those described in the preceding paragraph (i.e., comparison of Alternative C to No-Action). In summary, the Project would shift land from private to public ownership, thereby removing land from property tax rolls and reducing the property tax revenues accruing to Fresno and Madera counties. Because the potential loss in property tax revenues is minor compared to property tax revenues generated in the region (less than 0.2 percent), this impact is considered **less than substantial**.

Impact ECON-5 (Alternative C): *Change in Population Growth and Housing Demand*. Under Alternative C, effects on population growth and housing demand would be similar to those described under Alternative A; refer to Impact ECON-5 (Alternative A) above. Compared to existing conditions, Alternative C would likely result in a limited increase in housing demand during construction, which would be accommodated by local housing resource; no long-term housing effects are anticipated. This impact is considered **less than significant**.

Impact ECON-6 (Alternative C): *Losses to the Lower San Joaquin Levee District.* Refer to Impact ECON-6 (Alternative A). Potential impacts of Alternative C are similar to potential impacts of Alternative A. Under Alternative C, there would be a permanent loss of about 1,516 acres of agricultural land from production and temporary displacement of another 73 acres of agricultural production during construction. Although this would cause a reduction in the LSJLD's tax revenues, the amount of revenues lost would be small (less than 1 percent) compared to total revenues. This impact would be **less than substantial**.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

All of the Project alternatives, including Alternative D, would entail land acquisition, construction and operations and maintenance of new Project facilities, and implementation of habitat restoration activities that could affect socioeconomic conditions in the Project area and the larger regional economy.

Impact ECON-1 (Alternative D): *Change in Agricultural Production Values*. Alternative D would permanently remove approximately 1,291 acres of agricultural land from production, temporarily displace 69 acres of agricultural production during construction, and shift agricultural uses on another 956 acres within the proposed floodplain; refer to Impact AG-LU-1 (Alternative D) for more details. The farm-gate value of commodities produced on lands subject to permanent losses would be roughly $8.8 million annually, representing about 53 percent of the total value of agricultural production in the Project area (see Table 21-14). There would be an additional $270,000 in annual crop losses during the construction timeframe due to temporary displacement of agricultural production. The direct economic effect on farmers would be negligible because privately-owned farmland would be purchased and property owners compensated at fair market value for their land, which is generally based on revenue potential for agricultural properties. At the regional level, the decline in agricultural production values is minor (about 0.1 percent) when compared to agricultural activity in Fresno and Madera counties, which was valued at $8.5 billion in 2011.

When comparing Alternative D to existing conditions, impacts on the value of agricultural production would be similar to those described in the preceding paragraph (i.e., comparison of Alternative D to No-Action). In summary, the Project would remove land from agricultural production and diminish the value of agricultural commodities produced in the Project area. Because the decline in agricultural values is small relative to production values in the region (about 0.1 percent), this impact is considered **less than substantial**.

Impact ECON-2 (Alternative D): ***Effects on the Regional Economy from Changes in Agricultural Production***. Under Alternative D, effects on the regional economy from changes in agricultural production would be similar to those described under Alternative A; refer to Impact ECON-2 (Alternative A) for more details. The regional economic impacts associated with permanent and temporary changes in agricultural production are presented above in Table 21-15. Compared to No-Action Alternative D would have a long-term adverse effect on the regional economy due to permanent losses in agricultural production and related spending. Specifically, the direct effects at the farm level include annual losses of $8.8 million in economic output (agricultural production value), $2.6 million in labor income, and 56 jobs. The total economic impacts (incorporating ripple effects in the regional economy) include annual losses of $14.0 million in output, $4.3 million in labor income, and 103 jobs in the two-county economy compared to No-Action; these effects are minor when considered in the context of the total economic activity supported throughout the regional economy (e.g., annual output losses are less than 0.17 percent of regional agricultural production alone). Temporary effects in the regional economy from changes in agricultural production during construction would be relatively small (e.g., annual output losses are less than 0.005 percent of the regional agricultural production).

When comparing Alternative D to existing conditions, impacts on the regional economy as a result of decreased agricultural production would be similar to those described in the preceding paragraph (i.e., comparison of Alternative D to No-Action). In summary, the Project would cause a decline in economic production, labor income, and jobs in Fresno and Madera counties. Because these adverse effects in the regional economy are small relative to total economic activity in the region, this impact is considered **less than substantial**.

Impact ECON-3 (Alternative D): ***Effects on the Regional Economy from Construction and Operations and Maintenance Spending***. Compared to No-Action, implementation of Alternative D would generate regional economic benefits to Fresno and Madera counties during construction and operations and maintenance, which are presented above in Table 21-16; refer to Impact ECON-3 (Alternative A) for more details.

In summary, the total cost of the Project under Alternative D is estimated at $505.4 million over the approximate 13-year construction period. The direct economic benefits of Project construction include $35.7 million in economic output, $8.8 million in labor income, and approximately 100 jobs annually. Accounting for the “ripple” (or multiplier) effects in the regional economy, the annual construction benefits of the Project under Alternative D total $55.0 million in output, $15.8 million in labor income, and 258 jobs throughout the local economy. These construction effects would be temporary, however, lasting only over the construction period.

Project operations and maintenance would also generate long-term economic benefits to the region. Under Alternative D, the total operations and maintenance budget is approximately $1.1 million (corresponding to the direct output value of Project operations), which includes $822,000 for expenditures on goods and services and

$278,000 in labor payroll that would support roughly four jobs. When considering the additional economic activity supported by these expenditures, Alternative D would generate an estimated $1.9 million in total economic output, $564,000 in total labor income, and about 11 total jobs annually. The benefits associated with Project operations and maintenance would be long term, extending over the life of the Project.

When comparing Alternative D to existing conditions, effects on the regional economy as a result of construction and operations and maintenance of the Project would be similar to those described in the preceding paragraphs (i.e., comparison of Alternative D to No-Action). In summary, the Project would generate new economic activity, namely increases in economic production, labor income, and jobs in Fresno and Madera counties over both the short and long term and this would be a **beneficial** effect.

Impact ECON-4 (Alternative D): ***Effects on Local Tax Revenues***. Under Alternative D, effects on local tax revenues would be similar to those described under Alternative A; refer to Impact ECON-4 (Alternative A) for more details. Compared to No-Action, it is estimated that Alternative D would result in a reduction in property tax revenues ranging between $329,000 and $490,000 annually, which accounts for less than 0.3 percent of the total combined property tax revenue collected in Fresno and Madera counties.

When comparing Alternative D to existing conditions, impacts on property tax revenues would be similar to those described in the preceding paragraph (i.e., comparison of Alternative D to No-Action). In summary, the Project would shift land from private to public ownership, thereby removing land from property tax rolls and reducing the property tax revenues accruing to Fresno and Madera counties. Because the potential loss in property tax revenues is minor compared to property tax revenues generated in the region (less than 0.3 percent), this impact is considered **less than substantial**.

Impact ECON-5 (Alternative D): ***Change in Population Growth and Housing Demand***. Under Alternative D, effects on population growth and housing demand would be roughly the same as those described under Alternative A; refer to Impact ECON-5 (Alternative A) for more details. Compared to existing conditions, Alternative D would likely result in a limited increase in housing demand during construction, which would be accommodated by local housing resource; no long-term housing effects are anticipated. This impact is considered **less than significant**.

Impact ECON-6 (Alternative D): ***Losses to the Lower San Joaquin Levee District.*** Refer to Impact ECON-6 (Alternative A). Potential impacts of Alternative D are similar to potential impacts of Alternative A. Alternative D would permanently remove approximately 1,291 acres of agricultural land from production, temporarily displace 69 acres of agricultural production during construction, and shift agricultural uses on another 956 acres within the proposed floodplain. Although this would cause a reduction in the LSJLD's tax revenues, the amount of revenues lost would be small (less than 1 percent) compared to total revenues. This impact would be **less than substantial**.

22.0 Transportation and Traffic

This chapter evaluates the potential effects of the Project on transportation and traffic in the Project area. The analysis primarily examines impacts on roadway circulation system levels of service (LOS) within the Project area during construction and operation of the Project. This section also identifies and reviews applicable laws, ordinances, regulations, and standards relevant to traffic and transportation activities.

Information sources include data collected from the California Department of Transportation (Caltrans) traffic count database (2013), traffic counts collected for local roadways, traffic field review and observation of current roadway operating conditions, and field reconnaissance survey of the roadway circulation system of the Project area. Site reconnaissance was performed on August 2, 2011, to document roadway characteristics, identify physical constraints, and assess general traffic conditions. In addition to the Caltrans traffic counts, new roadway traffic counts for five local roadway segments were collected on the last week of August 2011 (Appendix 22-A).

22.1 Environmental Setting

The following section provides information regarding the affected transportation and traffic environment and includes a discussion of roadway operating conditions in terms of LOS. The Project area is generally located along the San Joaquin River east of State Route (SR) 33 in Fresno and Madera Counties and the Project area is located east of the city of Mendota. As shown in Figure 22-1, the Project footprint is located in the along the San Joaquin River and extends from below Mendota Dam to the Chowchilla Bifurcation Structure.

22.1.1 Roadway Network

Several regionally and locally significant roadways traverse the Project area. Key characteristics of the roadway circulation system within the Project area are as follows:

- *State Route 33* - SR 33 is north-south State highway located west and southwest of the Project area. It is also referred to as Derrick Avenue within the Mendota city limits. The highway provides for one to two lanes in each direction in the Project vicinity and has a current Average Daily Traffic (ADT) of 11,800 vehicles per day south of the SR 180 junction.

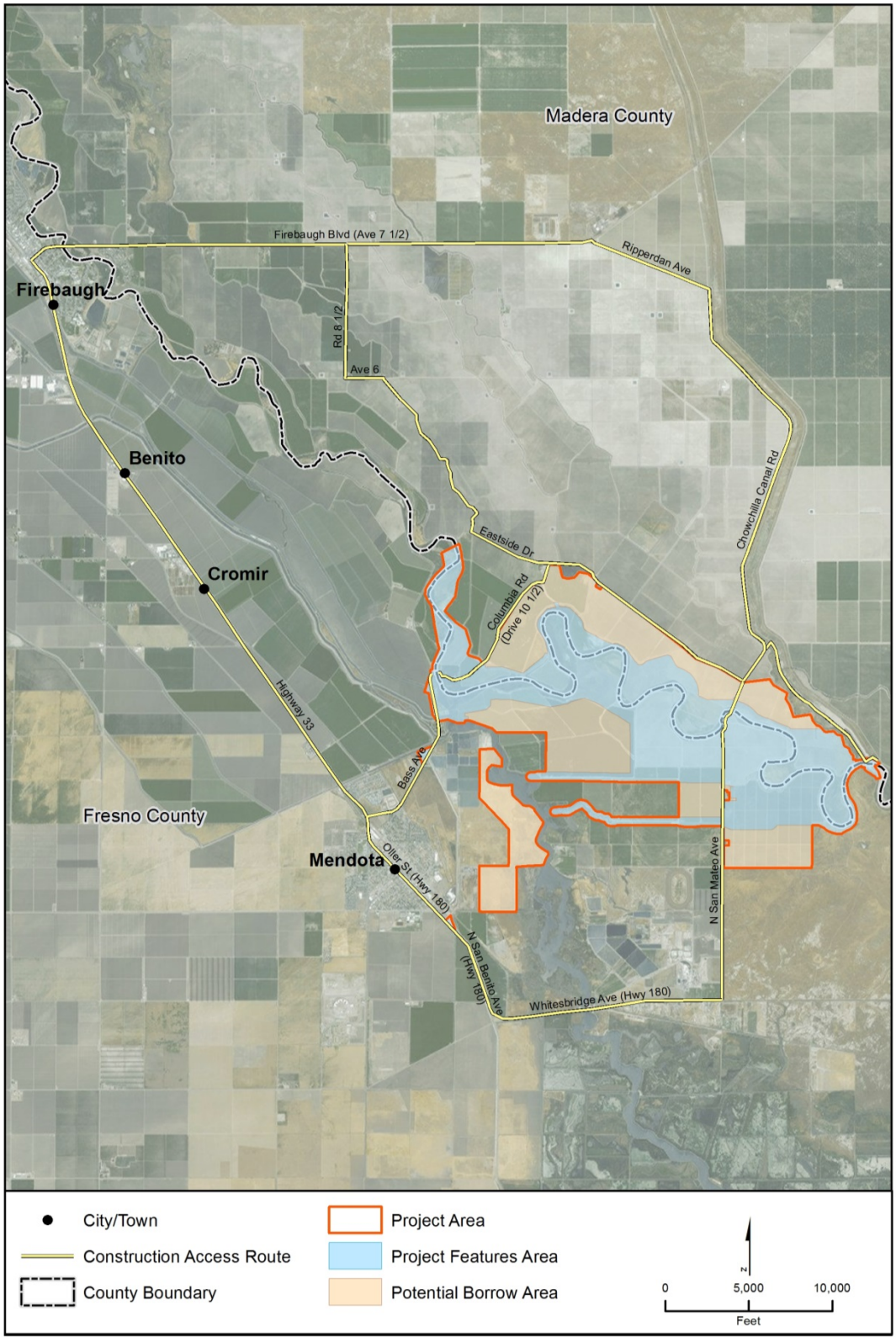

Figure 22-1.
Transportation Setting of the Project Area and Affected Roadways

- *State Route 180* - SR 180 is an east-west State highway located south of the Project area. It is also referred to as Whitebridge Avenue. The highway provides for one lane in each direction in the Project area and has a current ADT of 8,200 vehicles per day. It has a speed limit of 55 miles per hour. Caltrans is proposing that the California Transportation Commission adopt a new segment of SR 180, from Interstate 5 to the end of the freeway portion of SR 180, near Valentine Avenue in the city of Fresno.
- *Firebaugh Boulevard* - Firebaugh Boulevard is a two lane east-west roadway located north of the Project area. East of the San Joaquin River, Firebaugh Boulevard is also referred to as Avenue 7 ½ on Madera County documents. West of Ripperdan Avenue, it has an ADT of 5,460 vehicles per day. East of Ripperdan Avenue, the ADT is 3,039 vehicles per day.
- *Ripperdan Avenue* - Ripperdan Avenue is a two lane east-west roadway connecting with Firebaugh Boulevard. It has an ADT of 3,097 vehicles per day. East of the Chowchilla Bypass Canal the road becomes Avenue 7. The intersection of Ripperdan Avenue and Firebaugh Boulevard is controlled by a STOP sign on Ripperdan Avenue and no controls on Firebaugh Boulevard.
- *Bass Avenue* - Bass Avenue is a two-lane north-south local roadway originating from SR 33 and providing direct access to the Mendota Dam area and its immediate vicinity. Bass Avenue has an ADT of 510 vehicles per day.
- *San Mateo Avenue* - San Mateo Avenue is a north-south two-lane road west of the Chowchilla Bifurcation Structure. The segment of San Mateo Avenue north of SR 180 has an ADT of 547 vehicles per day. The intersection of San Mateo Avenue and SR 180 is controlled by a STOP sign on San Mateo Avenue and no controls on SR 180.

22.1.2 Study Roadway Segments

Site reconnaissance and the traffic study field review identified five local roadway segments that could potentially be impacted by the Project. Subsequently, segments of SR 33 and SR 180 were included to evaluate regional traffic impacts. Table 22-1 describes the cross-sectional characteristics of the study roadway segments and their respective administering jurisdictional agencies.

22.1.3 Existing Traffic Volume

Traffic data collected for the Project included 24-hour ADT counts collected on the month of August 2011 by National Data Services. The 24-hour ADT traffic count data sheets for the roadway segments evaluated in this report are included in Appendix 22-A. The August 2011 condition is similar to the July 2009 condition because there has not been substantial growth in the Project area during this time period; therefore, it is used to represent the existing condition baseline for the California Environmental Quality Act (CEQA) analysis of environmental impacts.

Table 22-1.
Study Roadway Segments

Roadway Segment	No. of Lanes	Jurisdiction
1. Firebaugh Boulevard east of Ripperdan Avenue	1/U	Madera County
2. Firebaugh Boulevard west of Ripperdan Avenue	1/U	Madera County
3. Ripperdan Avenue south of Firebaugh Boulevard	1/U	Madera County
4. San Mateo Avenue north of SR 180	1/U	Fresno County
5. Bass Avenue south of the Delta-Mendota Canal	1/U	Fresno County
6. SR 33 south of SR 180/33 Junction	2/U	Fresno County
7. SR 33 north of SR 180/33 Junction	1/U	Fresno County
8. SR 180 west of San Mateo Avenue	1/U	Fresno County
9. SR 180 east of San Mateo Avenue	1/U	Fresno County

Key:
1/U – One lane/undivided roadway
2/U – Two lane/undivided roadway
SR = State route

22.1.4 Existing Level of Service

LOS is an indicator of operating conditions on a roadway and is defined in categories ranging from LOS A to LOS F, with LOS A representing the best traffic flow and LOS F representing poor conditions. LOS A indicates free-flowing traffic and LOS F indicates substantial congestion with stop-and go traffic and long delays at intersections. The following sections discuss the LOS on the study roadway segments under existing conditions. See Section 22.3.1 for more detailed discussion of the LOS criteria and methodology used in the assessment of potential Project traffic impacts.

Roadway Segment Analysis

Table 22-2 summarizes the existing roadway segment LOS for the study roadway segments. As shown in Table 22-2, the study roadway segments are all currently operating at acceptable LOS A under existing conditions.

Table 22-2.
Study Roadway Segments – Existing Conditions

Roadway Segment	No. of Lanes (Each Direction)	ADT	LOS
1. Firebaugh Boulevard east of Ripperdan Avenue	1/U	3,036	A
2. Firebaugh Boulevard west of Ripperdan Avenue	1/U	5,460	A
3. Ripperdan Avenue south of Firebaugh Boulevard	1/U	3,097	A
4. San Mateo Avenue north of SR 180	1/U	547	A
5. Bass Avenue south of the Delta-Mendota Canal	1/U	510	A
6. SR 33 south of SR 180/33 Junction	2/U	11,800	A
7. SR 33 north of SR 180/33 Junction	1/U	5,600	A
8. SR 180 west of San Mateo Avenue	1/U	8,200	A
9. SR 180 east of San Mateo Avenue	1/U	8,200	A

Source: Caltrans 2013, National Data Surveying data (Appendix 22-A)
Key:
1/U – One lane/undivided roadway
2/U – Two lane/undivided roadway
ADT = average daily traffic
LOS = level of service
SR = State route

22.2 Regulatory Setting

This section discusses the regulatory setting for transportation and infrastructure in the Project area. This section identifies and reviews applicable laws, ordinances, regulations, and standards relevant to traffic and transportation activities.

22.2.1 Federal

Title 23, Code of Federal Regulations [CFR], Highways

The U.S. Department of Transportation (DOT) sets policy regarding the placement of utility facilities within the freeway rights-of-way. Federal statutes specify requirements for facilities that received Federal assistance. These include Federal interstate freeways and U.S. highways, most state routes, and certain local roads. The Federal Highway Administration (FHWA) regulations require each State to develop its own policy regarding the accommodation of utility facilities within freeway-rights-of-way. Once FHWA has approved a State's policy, the State can approve any proposed utility installation without referral to FHWA, unless it does not conform to the federally approved policy. Federal law does not directly control how States accommodate utilities within freeway rights-of-way. But, in determining whether a right-of-way on a federally aided freeway should be used for accommodating a utility facility, the Secretary of Transportation must (1) ascertain the effect accommodation of utilities would have on freeway and traffic safety, since no such use may be authorized or permitted that would adversely affect safety; (2) evaluate the direct and indirect environmental and economic effects of any loss of productive agricultural land or any impairment of its productivity that would result from disapproving accommodation of the utility facility; and (3) consider the environmental and economic effects together with any interference with or impairment of the use of the freeway that would result from accommodation of the utility facility (23 United States Code [USC] Section 109[l]). In addition, 23 USC Section 116 requires State transportation agencies to ensure proper maintenance of freeway facilities, which implies adequate control over non-freeway facilities such as utility facilities. Finally, 23 USC Section 123 specifies 25 when Federal funds can be used to pay for the costs of relocating utility facilities in connection with freeway construction projects (McCarthy 2004).

Title 49, CFR, Sections 171-177

Title 49 governs the transportation of hazardous materials, the types of materials defined as hazardous, and the marking of the transportation vehicles. The administering agencies for this are the California Highway Patrol and the DOT, Pipeline and Hazardous Materials Safety Administration. The Project would conform to this law by requiring that shippers of construction related hazardous materials use the required markings on their transportation vehicles.

22.2.2 State of California

State of California Department of Transportation

Caltrans is one of several departments within the Business, Transportation and Housing Agency. Caltrans' Right of Way and Asset Management Program, through the district

offices, is primarily responsible for acquisition and management of property required for State transportation purposes. Transportation purposes may include roads, mass transit guideways and related facilities, airports, shops, maintenance stations, storage yards, material sites, and any other purpose that may be necessary for Caltrans operations (Caltrans 2008a). Right of Way and Asset Management Program responsibilities include managing Caltrans' real property for transportation purposes, reducing the costs of operations, and disposing of property no longer needed and monitoring right-of-way activities on federally assisted local facilities.

An encroachment, as defined in Streets and Highways Code section 660, can be any tower, pole, pole line, pipe, pipe line, fence, billboard, stand, or building, or any structure or object of any kind or character that is within the right-of-way but not a part of the Caltrans facility. Authority for Caltrans to control encroachments within the State roadway is contained in the Streets and Highways Code starting with section 660.

Encroachments allow temporary or permanent use of roadway right-of-way by a utility, a public entity, or a private party. Encroachments include all public and private utilities within State rights-of-way, such as: communication, electric power, water, gas, oil, petroleum products, steam, sewer, drainage, irrigation, and similar facilities. Encroachments also include any temporary or permanent break in access or use of the roadway rights-of-way: for grading, excavating, or filling or removing of materials by public agencies, developers, or private individuals (Caltrans 2008b).

Encroachment permits are issued by Caltrans to other agencies or parties that perform construction activities within its right-of-way. Typical projects performed by other agencies or parties that require encroachment permits include roadway improvement construction and utility work. Under an encroachment permit, Caltrans requires the agency or party to implement an appropriate stormwater protection program. Caltrans retains ultimate responsibility for ensuring that the portion of the project within the Caltrans right-of-way is in compliance with Federal, State, and local stormwater protection regulations.

Caltrans specifically has interest in projects that may structurally modify deck slabs (not including raised sidewalks or utility attachments), girders (not including utility attachments), bottom slabs of superstructures, columns and supporting foundations, and abutments and supporting foundations.

California Vehicle Code, Sections 13369, 15275, 15278

California Vehicle Code addresses the licensing of drivers and the classification of license required for the operation of particular types of vehicles, requires a commercial driver’s license to operate commercial vehicles, and requires an endorsement issued by the Department of Motor Vehicles to drive any commercial vehicle identified in section 15278. The administering agency for these statutes is the Department of Motor Vehicles. The Project would comply with these codes by requiring that contractors and employees be properly licensed and endorsed when operating such vehicles.

California Vehicle Code, Section 35550

California Vehicle Code section 35551 imposes weight guidelines and restrictions on vehicles traveling on freeways and highways. The section holds that "a single axle load shall not exceed 20,000 pounds. The load on any one wheel or wheels supporting one end of an axle is limited to 10,500 pounds. The front steering axle load is limited to 12,500 pounds." Furthermore, California Vehicle Code section 35551 defines the maximum overall gross weight as 80,000 pounds and adds that "the gross weight of each set of tandem axles shall not exceed 34,000 pounds." The administering agency for this statute is Caltrans. The Project would comply with this code by requiring compliance with weight restrictions and by requiring heavy haulers to obtain permits, if required, prior to delivery of any heavy haul load.

California Vehicle Code, Section 35780

California Vehicle Code section 35780 requires a Single-Trip Transportation Permit to transport oversized or excessive loads over State highways. The permit can be acquired through Caltrans. The Project would comply with this code by requiring that heavy haulers obtain a Single-Trip Transportation Permit for oversized loads for each vehicle, prior to delivery of any oversized load.

California Streets and Highways Code, Section 117

Unless otherwise specified, the acquisition of any right-of-way over any real property for State highway purposes includes the right of the Department of Transportation to issue, under Chapter 3 (commencing with § 660), permits for any structures or fixtures necessary to telegraph, telephone, or electric power lines or of any ditches, pipes, drains, sewers, or underground structures located in the public rights-of-way. The administering agency for this statute is Caltrans. The Project would coordinate with Caltrans with regard to use of public rights-of-way.

California Streets and Highways Code, Sections 660, 670, 672, 1450, 1460, 1470, 1480 et seq.

This code defines highways and encroachment, requires encroachment permits for projects involving excavation in State highways and county/city streets. This law is generally enforced at the local level. The administering agencies for this regulation are Caltrans, and Fresno and Madera counties. The Project would apply for encroachment permits for any excavation in State and county roadways prior to construction.

California Manual on Uniform Traffic Control Devices, Part 6

This regulation requires a temporary traffic control plan to be provided for "continuity of function (movement of traffic, pedestrians, bicyclists, transit operations), and access to property/utilities" during any time the normal function of a roadway is suspended. The administering agencies for this regulation are Caltrans, and Fresno and Madera counties. If applicable, a Traffic Control Plan would be prepared prior to the start of construction.

22.2.3 Regional and Local

Fresno Council of Governments' Regional Transportation Plan

The Fresno Council of Governments' Regional Transportation Plan (RTP) (2010) is a comprehensive assessment of all forms of transportation available in Fresno County and of needs for travel and goods movement projected into the future until the year 2030. The first RTP was adopted in 1975; this Plan is the latest edition, and is a continuation of a process of intergovernmental cooperation, coordination and long-range planning which has involved the 15 cities within Fresno County, staff from related local public agencies, the Air District, Caltrans, and the public. This process has been accomplished within the framework of the Council of Fresno County Governments, which is the Regional Transportation Planning Agency for the Fresno County area. Updated editions are required every 4 years and are refinements of the original and subsequent plans. Federal and State legislation mandate that long-range transportation planning be done every 4 years for a period of at least 20 years into the future.

Madera County Council of Governments' Regional Transportation Plan

The Madera County RTP (2010) was previously prepared by VRPA Technologies and Madera County Transportation Commission staff and approved by the Madera County Transportation Commission Policy Board in 2007. The Madera County Transportation Commission updated the RTP to reflect the transportation system through Fiscal Year (FY) 2035. The RTP ensures that the County's transportation system and implementation policies/programs through FY 2035 would safely and efficiently accommodate growth envisioned in the Land Use Elements of the cities of Chowchilla and Madera, and Madera County. The RTP includes programs and policies for congestion management, transit, bicycles and pedestrians, roadways, freight, and finances. The RTP is revised at least every 4 years, since the County is designated as nonattainment for Federal air quality standards.

The RTP's primary use is as a regional long-range plan for federally funded transportation projects, and it also serves as a comprehensive, coordinated transportation plan for all the governmental jurisdictions within the region. Different jurisdictions have different transportation implementation responsibilities under the RTP. These include Caltrans, Madera County, and the cities of Chowchilla and Madera.

22.3 Environmental Consequences and Mitigation Measures

22.3.1 Impact Assessment Methodology

This section describes the approach for evaluating transportation and traffic impacts. The Project would have two types of transportation and traffic impacts that have been evaluated for impacts, namely:

- Project construction impacts.
- Project operations and maintenance impacts.

The analysis of transportation and traffic-related effects of the Project is presented based on the construction and operational characteristics of the Project alternatives, including the type, location, trip generation, trip distribution and duration of restoration activities.

Project Construction (Short-Term)

During Project construction, there would be a short-term increase in Project related construction traffic and demand for roadway capacity and alternate routes associated with construction activities. Construction impacts have been evaluated for traffic and transportation impacts using the following methodology and assumption inputs.

- Data collection (traffic counts) and development of Project construction trip generation estimates (including worker, material and equipment delivery traffic to and from the Project site).
- Identification of borrow pit locations and estimation of soil material (truck trips) that may need to be transported on local roads.
- Calculation of roadway capacities and LOS under baseline conditions and with Project construction conditions. All roadway analysis scenarios were evaluated using *Highway Capacity Manual 2000* Analysis Procedures and Methodology (Transportation Research Board 2000).
- Assessment of potential Project related roadway closures resulting from Project construction activities. Alternate routes were identified and provided, as needed, and impacts to emergency response time were evaluated.

Project Operations and Maintenance (Long-Term)

After the conclusion of Project construction activities, there would be recurring Project operations and maintenance traffic associated with the maintenance and upkeep of the Project. Long-term operations and maintenance impacts were evaluated for traffic and transportation impacts using the following methodology and assumption inputs.

- Development of Project operations trip generation including worker and maintenance vehicle movements to and from the Project site.
- Identification of frequency of Project operations and maintenance activities.
- Identification of major Project operations and maintenance activities that may affect roadway system operations (e.g., work vehicles/activities adjacent to roadway right-of-ways, wide loads, heavy specialty equipment, etc.).
- Assessment of potential Project related roadway closures resulting from Project operations activities. Alternate routes were identified and provided, as needed, and impacts to emergency response time were evaluated.

Roadway Segment Analysis

Highway Capacity Manual 2000 (Transportation Research Board 2000) defines LOS as a quantitative measure describing operational characteristics within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience. LOS characteristics for road segments are presented in Table 22-3.

Table 22-3.
Roadway Level of Service Descriptions

Level of Service	Description of Operation
A	Primarily free flow operations
B	Reasonably unimpeded operations, ability to maneuver only slightly restricted
C	Stable operations, ability to maneuver and select operating speed affected
D	Unstable flow, speeds and ability to maneuver restricted.
E	Significant delays, flow quite unstable.
F	Extremely slow speeds.

Table 22-4 provides the LOS and Peak Hour Directional Volume thresholds for highways and local roadways within Fresno County. Table 22-4 was based on the Florida Department of Transportation (2009), Table 9, Generalized Peak Hour Directional Volumes for Florida's Rural Undeveloped Areas and Cities or Developed Areas with less than 5,000 population. This is a modified Highway Capacity Manual-based LOS table (Florida Table), which is approved for use in Fresno County. The table considers the capacity of individual roadway segments based on numerous roadway variables (such as highway design speed, number of passing lanes, saturation flow, shoulder width, intersection spacing, etc.). Highways are generally considered uninterrupted flow roadways (two lane or multilane). Uninterrupted flow highways are roadways with a combination of roadway segments which have average signalized intersection spacing greater than 2.0 miles and are not freeways. Interrupted flow roadways are characterized by signals with average signalized intersection spacing less than or equal to 2.0 miles.

Table 22-4.
Fresno County Volume Thresholds for Roadway Level of Service for Uninterrupted Flow Highways

No of Lanes in Each Direction	Median Type	LOS and Volume Thresholds (Uninterrupted Flow Highways)					
		A	B	C	D	E	F
1	Undivided (U)	-	≤420	420-780	780-1100	1100-1400	>1400
1	Divided (D)	-	≤445	445-820	820-1155	1155-1470	>1470
2	Undivided (U)	-	≤1300	1300-2040	2040-2630	2630-3000	>3000
2	Divided (D)	-	≤1365	1365-2145	2145-2765	2765-3150	>3150
3	Divided (D)	-	≤1950	1950-3060	3060-3950	3950-4500	>4500

Source: Florida Department of Transportation 2009, Generalized Peak Hour Directional Volumes for Florida's Rural Undeveloped Areas and Cities or Developed Areas Less Than 5,000 population
Key:
LOS = Level of Service

Madera County uses evaluation criteria for roadway segments based on daily traffic volume. Table 22-5 shows the Madera County LOS criteria. For analysis purposes, all roadway segments were evaluated using Table 22-5 based on the estimated daily trip generation data for the Project alternatives.

Table 22-5.
Madera County Regional Transportation Plan Roadway Capacity/Level of Service

Roadway Classification	Number of Lanes	Maximum Two-Way Average Daily Traffic (ADT)[1,2]				
		LOS A	LOS B	LOS C	LOS D	LOS E
Collector	2	7,800	9,100	10,400	11,700	13,000
Secondary	4	15,500	18,100	20,700	23,300	25,900
Major	4	20,500	23,900	27,300	30,700	34,100
Arterial [3]	2	10,800	12,600	14,400	16,200	18,000
Arterial	4	21,500	25,100	28,700	32,300	35,900
Mountain Arterial [3]	2	9,700	11,300	12,900	14,500	16,100
Mountain Arterial	3	12,500	14,600	16,700	18,800	20,900
Mountain Arterial	4	22,300	26,000	29,800	33,500	37,200
Urban Arterial	4	21,500	25,100	28,700	32,300	35,900
Urban Arterial	6	32,300	37,700	43,100	48,500	53,900
Urban Arterial	8	43,100	50,300	57,400	64,600	71,800
Expressway [4]	4	24,500	28,600	32,700	36,800	40,900
Expressway [4]	6	36,800	42,900	49,000	55,200	61,300
Expressway [4]	8	49,000	57,200	65,400	73,500	81,700
Freeway	4	45,900	53,600	61,200	68,900	76,500
Freeway	6	70,500	82,200	94,000	105,800	117,500
Freeway	8	96,300	112,400	128,400	144,500	160,500
Freeway	10	120,400	140,400	160,500	180,500	200,600

Key:
ADT = average daily traffic
LOS = level of service

Notes:
[1] All Capacity figures are based on optimum conditions and are intended as guidelines for planning purposes only.
[2] Maximum two-way ADT values are based on the 1999 Modified Highway Capacity Manual Level of Service Tables.
[3] Level two-lane arterials are analyzed as arterials.
[4] There are currently no roadways in Madera County that match this category, but capacity values are included for future conditions analysis.

22.3.2 Significance Criteria

Potential impacts to transportation and traffic systems and facilities could occur if Project actions were to result in any of the following:

- Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the roadway system.
- Exceed, either individually or cumulatively, a LOS standard established by the county congestion management agency for designated roads or highways.
- Substantially increase hazards to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).
- Result in inadequate emergency access (e.g., affecting emergency response time).

22.3.3 Impacts and Mitigation Measures

This section provides a Project-level evaluation of direct and indirect effects of the Project alternatives on transportation and traffic. It includes analyses of potential effects relative to No-Action conditions in accordance with National Environmental Policy Act and potential impacts compared to existing conditions to meet CEQA requirements. The analysis is organized by Project alternative with specific impact topics numbered sequentially under each alternative. With respect to transportation and traffic, the environmental impact issues and concerns are:

1. Potential to Cause an Increase in Traffic which is Substantial in Relation to the Existing Traffic Load and Capacity of the Roadway System.
2. Potential to Exceed, Either Individually or Cumulatively, a LOS Standard Established By the County Congestion Management Agency for Designated Roads or Highways.
3. Potential to Substantially Increase Hazards to a Design Feature (e.g., sharp curves or dangerous intersections) or Increase Incompatible Uses (e.g., farm equipment).
4. Potential to Result in Inadequate Emergency Access.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the San Joaquin River Restoration Program (SJRRP) would be implemented, including habitat restoration in other reaches, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these Program-level activities would not achieve the Settlement goals. This section describes the impacts of the No-Action Alternative. The analysis is a comparison to existing conditions, and since the No-Action Alternative would not involve Project construction or operations, no mitigation is required for No-Action alternative.

In consultation with Fresno Council of Governments (Fresno COG) (Bitner, pers. comm. 2013) and coordination with County of Madera Planning staff (Winning, pers. comm. 2013), the latest approved version of the Fresno COG transportation model was used to develop 2035 baseline conditions, which were subsequently used to develop the No-Action Alternative. An ambient traffic growth of 1 percent per year is derived from the Fresno COG transportation model. Table 22-6 shows the ADT and LOS associated with existing and No-Action conditions; there would be no change in ADT or LOS directly attributable to the Project under the No-Action Alternative.

Impact TRA-1 (No-Action Alternative): ***Potential to Cause an Increase in Traffic which is Substantial in Relation to the Existing Traffic Load and Capacity of the Roadway System.*** Under the No-Action Alternative, the Project would not be implemented and there would be no associated construction activities in the Project area. In addition, there would be no Project operations and maintenance. As a result, there would be **no impact** on the roadway circulation system.

Table 22-6.
Roadway Segments LOS – Existing and No-Action Construction Conditions

Road	Description	Existing ADTs	Existing LOS	No-Action 2035 ADTs	No-Action LOS
Firebaugh Blvd	East of Ripperdan Avenue	3,036	A	3,765	A
Firebaugh Blvd	West if Ripperdan Avenue	5,460	A	6,770	A
Ripperdan Ave	South of Firebaugh Blvd	3,037	A	3,766	A
Bass Avenue	Bass Avenue east of SR 33	510	A	632	A
San Mateo Ave	San Mateo Avenue north of SR 180	547	A	678	A
S. SR 33	SR 33 south of SR 180/33 Junction	11,800	A	14,632	A
N. SR 33	SR 33 north of SR 180/33 Junction	5,600	A	6,944	A
W. SR 180	SR 180 west of San Mateo Avenue	8,200	A	10,168	A
E. SR 180	SR 180 east of San Mateo Avenue	8,200	A	10,168	A

Key:
ADT = average daily traffic
LOS = level of service
SR = State route

Impact TRA-2 (No-Action Alternative): ***Potential to Exceed, Either Individually or Cumulatively, a LOS Standard Established By the County Congestion Management Agency for Designated Roads or Highways.*** Under the No-Action Alternative, none of the proposed facilities that are part of the Project would be developed. Therefore, there would be no Project construction or operations that would result in additional traffic that may cause exceedance of existing LOS standards at designated congestion management program roads or highways in the Project area. As a result, there would be **no impact** on the existing roadway circulation system.

Impact TRA-3 (No-Action Alternative): ***Potential to Substantially Increase Hazards to a Design Feature or Increase Incompatible Uses.*** Under the No-Action Alternative, the Project would not be implemented and there would be no associated construction activities or long-term operational activities that would cause an increase in hazards due to a Project design feature or introduce incompatible use in the Project area. In addition, the Project would not have hazardous design features or incompatible use, as proposed. As a result, there would be **no impact** on the existing roadway circulation system.

Impact TRA-4 (No-Action Alternative): ***Potential to Result in Inadequate Emergency Access.*** Under the No-Action Alternative, none of the proposed facilities that are part of the Project would be developed. Therefore, there would be no Project construction or operations and maintenance that would result in additional traffic that may cause inadequate emergency access in the Project area. In addition, the Project would not block roadways or create roadway discontinuities that would affect existing emergency access.

However, Restoration Flows would limit emergency access at the San Mateo Avenue crossing more frequently and for longer durations during the year than existing conditions. This would cause emergency service providers to use alternative access

routes, such as Drive 10 ½, when flows exceed the capacity of the San Mateo Avenue crossing (150 cubic feet per second). Flows would typically be greater than the existing culvert capacity during November to April. This could impact emergency response times to the northeastern portion of the Project area for half of the year. Because high flows would affect access at the San Mateo Avenue crossing more frequently and for longer durations, impacts to emergency access would be **potentially significant and unavoidable**. No mitigation is required for No-Action.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would entail construction of Project facilities, including a levee system to establish a bypass channel to the northeast of the existing river channel. Other key features include construction of a fish barrier below Mendota Dam, the Mendota Pool dike (separating the San Joaquin River and Mendota Pool), and the South Canal and South Canal bifurcation structure. No construction activities are proposed at or near Mendota Dam, which falls outside the Project boundary under Alternative A. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Tables 22-7 and 22-8 summarize the results of the roadway segment analyses comparing Alternative A roadway LOS construction conditions with 2035 No-Action and existing conditions respectively. Project operations under Alternative A are anticipated to have low trip generation potential. Therefore, no LOS analyses were conducted beyond the aforementioned Alternative A construction conditions.

Table 22-7.
Roadway Segments LOS – 2035 No-Action and Alt. A Construction Conditions

Road	Description	No-Action 2035 ADTs	No-Action LOS	Alt A 2035 ADTs	Alt A 2035 LOS
Firebaugh Blvd	East of Ripperdan Avenue	3,765	A	3,765	A
Firebaugh Blvd	West if Ripperdan Avenue	6,770	A	6,770	A
Ripperdan Ave	South of Firebaugh Blvd	3,766	A	3,766	A
Bass Avenue	Bass Avenue east of SR 33	632	A	832	A
San Mateo Ave	San Mateo Avenue north of SR 180	678	A	6,714	A
S. SR 33	SR 33 south of SR 180/33 Junction	14,632	A	15,879	A
N. SR 33	SR 33 north of SR 180/33 Junction	6,944	A	7,686	A
W. SR 180	SR 180 west of San Mateo Avenue	10,168	A	12,171	B
E. SR 180	SR 180 east of San Mateo Avenue	10,168	A	12,462	B

Key:
ADT = average daily traffic
LOS = level of service
SR = State route

Table 22-8.
Roadway Segments LOS – Existing and Alt. A Project Construction Conditions

Road	Description	Existing ADTs	Existing LOS	Alt A ADTs	Alt A LOS
Firebaugh Blvd	East of Ripperdan Avenue	3,036	A	3,036	A
Firebaugh Blvd	West if Ripperdan Avenue	5,460	A	5,460	A
Ripperdan Ave	South of Firebaugh Blvd	3,037	A	3,037	A
Bass Avenue	Bass Avenue east of SR 33	510	A	710	A
San Mateo Ave	San Mateo Ave north of SR 180	547	A	6,583	A
S. SR 33	SR 33 south of SR 180/33 Junction	11,800	A	13,047	A
N. SR 33	SR 33 north of SR 180/33 Junction	5,600	A	6,342	A
W. SR 180	SR 180 west of San Mateo Avenue	8,200	A	10,203	A
E. SR 180	SR 180 east of San Mateo Avenue	8,200	A	10,494	A

Key:
ADT = average daily traffic
LOS = level of service
SR = State route

Impact TRA-1 (Alternative A): ***Potential to Cause an Increase in Traffic which is Substantial in Relation to the Existing Traffic Load and Capacity of the Roadway System.*** Under Alternative A, the Project would be implemented and construction activities would be anticipated in the Project area. In addition, facilities would need to be maintained and operated. Although there would be an anticipated increase in Project added traffic during construction (as compared to the No-Action Alternative), the traffic levels are still within acceptable limits in context to the roadway capacities (see Table 22-5 for roadway capacities).

When comparing Alternative A to existing conditions, impacts from construction generated trips would be similar to those described in the preceding paragraph (i.e., comparison of Alternative A to No-Action). Based on the results of the comparison of roadway segment volumes to existing conditions, there would be a **less than significant** impact to the roadway circulation system traffic loads and capacities.

Impact TRA-2 (Alternative A): ***Potential to Exceed, Either Individually or Cumulatively, a LOS Standard Established By the County Congestion Management Agency for Designated Roads or Highways.*** Compared to the No-Action Alternative, construction of Alternative A has the potential to generate additional traffic that may cause an exceedance of existing LOS standards at designated congestion management program roads or highways in the Project area. As shown in Table 22-7, none of the study roadway segment in the immediate vicinity of the Project site would experience a change to an unacceptable LOS due to Alternative A construction.

When comparing Alternative A to existing conditions, impacts from construction generated trips would be similar to those described in the preceding paragraph (i.e., comparison of Alternative A to No-Action). Based on the results of the comparison of Alternative A LOS to the existing conditions LOS, there would be a **less than significant** impact to the roadway circulation system LOS.

Impact TRA-3 (Alternative A): ***Potential to Substantially Increase Hazards to a Design Feature or Increase Incompatible Uses.*** Compared to the No-Action Alternative, Alternative A would not cause a substantial increase in hazards due to a Project design feature or introduce incompatible use in the Project area. The Project design features would primarily be implemented in areas other than the roadway circulation system and are not intended to be used as public traveled way. In addition, Alternative A, as proposed, would not introduce hazardous design features or incompatible uses.

When comparing Alternative A to existing conditions, impacts from design features and incompatible uses would be similar to those described in the preceding paragraph (i.e., comparison of Alternative A to No-Action). As a result, there would be a **less than significant** impact to the roadway circulation system.

Impact TRA-4 (Alternative A): ***Potential to Result in Inadequate Emergency Access.*** Compared to the No-Action Alternative, Alternative A would result in a permanent road closure at Drive 10 ½ that may affect emergency access. The Compact Bypass would cross the existing Drive 10 ½, which provides access to the east side of Mendota Dam. With this alternative, the road would end at the east side of the bypass channel and would not continue to Mendota Dam. Construction of Alternative A would also result in a temporary road closure at the San Mateo Avenue crossing that may affect emergency access and/or emergency response times to areas north of the river for several months.

Fresno County and Madera County fire units and emergency responders provide each other with mutual assistance. The Mendota Fire Station 96 is located within 3 miles of the Mendota Pool and is likely to provide emergency services and act as first responders in the Project area. Current estimates by the Fresno County Fire Protection District (FCFPD) provide for a 10 minute response time to Project areas south of the river (FCFPD 2007). With the closure of Drive 10 ½ or the San Mateo Avenue crossing, emergency response times could increase by 15 minutes or more to areas immediately north of the crossing (Keenan, pers. comm. 2013). This would likely increase response times beyond the County's 20 minutes goal for rural areas.

Alternative A construction activities also would result in added trips to the roadway circulation system that could potentially affect the speed and response times of emergency vehicles and first responders in other areas, however the results of the roadway segment analysis indicate that roadway capacity and LOS are within acceptable levels, which also correlate to acceptable travel speeds.

When comparing Alternative A to existing conditions, impacts to emergency access and response times would be similar to those described in the preceding paragraphs (i.e., comparison of Alternative A to No-Action). As a result, there would be a **potentially significant** impact to the roadway circulation system.

Mitigation Measure TRA-4A (Alternative A): ***Provide Temporary Roadway and Crossing at San Mateo Avenue.*** Construction activities in the Project area will be modified to provide a temporary roadway and crossing at San Mateo Avenue during construction to allow for thru-traffic and access, including levee, canal, and river crossing

construction areas (as applicable). Local emergency dispatchers will also be notified of temporary road closures associated with this crossing. Implementation of Mitigation Measure TRA-4A (Alternative A) will reduce short-term impacts to emergency access near San Mateo Avenue during construction.

Implementation Action: Provide temporary roadway and crossing at San Mateo Avenue to allow for thru-traffic and access around areas of active construction. Access will be provided over or around construction areas at levee, canal, or river crossings (as applicable). This temporary road would likely have a single lane for construction access and a single public access lane that would be barricaded from the construction side. Flagmen would likely be used to control traffic during daylight construction hours and a temporary traffic control stoplight would likely be used to control traffic during evenings and weekend hours.

Location: Active construction areas along San Mateo Avenue.

Effectiveness Criteria: Effectiveness will be based on access availability.

Responsible Agency: Reclamation and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and California State Lands Commission (CSLC) monitors.

Timing: Ongoing over the construction timeframe.

No feasible mitigation exists for long-term impacts to emergency response times to areas north of the river near the Drive 10 ½. Use of the closest river crossing (at San Mateo Avenue) would still increase emergency response times beyond the County's 20 minutes goal for rural areas. As a result, there would be a **significant and unavoidable** impact to the roadway circulation system.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Key features of Alternative B include construction of a levee system to establish a bypass channel to the northeast of the existing river channel, fish barrier below Mendota Dam, Compact Bypass Control Structure, Mendota Pool Control Structure, and re-route of Drive 10 ½. No construction activities are proposed at or near Mendota Dam, which falls outside the project boundary under Alternative B. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Tables 22-9 and 22-10 summarize the results of the roadway segment analyses comparing Alternative B roadway LOS construction conditions with 2035 No-Action and existing conditions respectively. Project operations under Alternative B are anticipated to have low trip generation potential. Therefore, no LOS analyses were conducted beyond the aforementioned Alternative B construction conditions.

Table 22-9.
Roadway Segments LOS – 2035 No-Action and Alt. B Construction Conditions

Road	Description	No-Action 2035 ADTs	No-Action LOS	Alt B 2035 ADTs	Alt B LOS
Firebaugh Blvd	East of Ripperdan Avenue	3,765	A	3,765	A
Firebaugh Blvd	West if Ripperdan Avenue	6,770	A	6,770	A
Ripperdan Ave	South of Firebaugh Blvd	3,766	A	3,766	A
Bass Avenue	Bass Avenue east of SR 33	632	A	832	A
San Mateo Ave	San Mateo Avenue north of SR 180	678	A	6,366	A
S. SR 33	SR 33 south of SR 180/33 Junction	14,632	A	15,789	A
N. SR 33	SR 33 north of SR 180/33 Junction	6,944	A	7,689	A
W. SR 180	SR 180 west of San Mateo Avenue	10,168	A	11,994	B
E. SR 180	SR 180 east of San Mateo Avenue	10,168	A	12,378	B

Key:
ADT = average daily traffic
LOS = level of service
SR = State route

Table 22-10.
Roadway Segments LOS – Existing and Alt. B Project Construction Conditions

Road	Description	Existing ADTs	Existing LOS	Alt B ADTs	Alt B LOS
Firebaugh Blvd	East of Ripperdan Avenue	3036	A	3,036	A
Firebaugh Blvd	West if Ripperdan Avenue	5460	A	5,460	A
Ripperdan Ave	South of Firebaugh Blvd	3037	A	3,037	A
Bass Avenue	Bass Avenue east of SR 33	510	A	710	A
San Mateo Ave	San Mateo Avenue north of SR 180	547	A	6,235	A
S. SR 33	SR 33 south of SR 180/33 Junction	11,800	A	12,957	A
N. SR 33	SR 33 north of SR 180/33 Junction	5,600	A	6,345	A
W. SR 180	SR 180 west of San Mateo Avenue	8,200	A	10,026	A
E. SR 180	SR 180 east of San Mateo Avenue	8,200	A	10,410	A

Key:
ADT = average daily traffic
LOS = level of service
SR = State route

Impact TRA-1 (Alternative B): ***Potential to Cause an Increase in Traffic which is Substantial in Relation to the Existing Traffic Load and Capacity of the Roadway System.*** Under Alternative B, the Project would be implemented and construction activities are anticipated in the Project area. In addition, facilities would need to be maintained and operated. Although there would be an anticipated increase in Project added traffic during construction, the traffic levels are still within acceptable limits in context to the roadway capacities (see Table 22-5 for roadway capacities).

When comparing Alternative B to existing conditions, impacts from construction generated trips would be similar to those described in the preceding paragraph (i.e.,

comparison of Alternative B to No-Action). Based on the results of the comparison of roadway segment volumes to existing conditions, there would be a **less than significant** impact to the roadway circulation system traffic loads and capacities.

Impact TRA-2 (Alternative B): ***Potential to Exceed, Either Individually or Cumulatively, a LOS Standard Established By the County Congestion Management Agency for Designated Roads or Highways.*** Compared to the No-Action Alternative, construction under Alternative B has the potential to generate additional traffic that may cause an exceedance of existing LOS standards at designated congestion management program roads or highways in the Project area. As shown in Table 22-9, none of the study roadway segments in the immediate vicinity of the Project site would experience a change to an unacceptable LOS due to construction under Alternative B.

When comparing Alternative B to existing conditions, impacts from construction generated trips would be similar to those described in the preceding paragraph (i.e., comparison of Alternative B to No-Action). Based on the results of the comparison of Alternative B LOS to the existing condition LOS, there would be a **less than significant** impact to the roadway circulation system LOS.

Impact TRA-3 (Alternative B): ***Potential to Substantially Increase Hazards to a Design Feature or Increase Incompatible Uses.*** Compared to the No-Action Alternative, Alternative B would not cause a substantial increase in hazards due to a Project design feature or introduce incompatible use in the Project area. The project design features would primarily be implemented in areas other than the roadway circulation system and most of these area are not intended to be used as public traveled way. The proposed reroute of Drive 10 ½ would not introduce sharp curves or dangerous intersections. In addition, Alternative B, as proposed, would not introduce incompatible uses.

When comparing Alternative B to existing conditions, impacts from design features and incompatible uses would be similar to those described in the preceding paragraph (i.e., comparison of Alternative B to No-Action). As a result, there would be a **less than significant** impact to the roadway circulation system.

Impact TRA-4 (Alternative B): ***Potential to Result in Inadequate Emergency Access.*** Compared to the No-Action Alternative, Alternative B would create a permanent road closure that may affect emergency access/emergency response times to areas immediately north of the San Mateo Avenue crossing. As part of this alternative, the culvert and road embankments at the San Mateo Avenue crossing would be demolished, and no river crossing would be provided at this location.

Fresno County and Madera County fire units and emergency responders provide each other with mutual assistance. The Mendota Fire Station 96 is located within 3 miles of the Mendota Pool and is likely to provide emergency services and act as first responders in the Project area. Current estimates by the FCFPD (2007) provide for a 10 minute response time to Project areas south of the river. With the closure of Drive 10 ½ or the San Mateo Avenue crossing, emergency response times could increase by 15 minutes or

more to areas immediately north of the crossing (Keenan, pers. comm. 2013). This would likely increase response times beyond the County's 20 minutes goal for rural areas.

Alternative B would also change the current alignment of Drive 10 ½. The Compact Bypass would cross the existing Drive 10 ½, which provides access for the operations and maintenance of Mendota Dam. To continue the current long-term level of access, the road would be rerouted along the bypass channel levees and cross the head of the bypass channel at the proposed Compact Bypass bifurcation structure. This proposed reroute is not anticipated to substantially increase travel time nor severely affect the access needs of local commuters.

Alternative B construction activities would also block roadways that may affect emergency access. Construction of Alternative B would result in a temporary road closure at Drive 10 ½ and/or the San Mateo Avenue crossing that may affect emergency access and emergency response times to areas north of the river for several months. Alternative B construction activities would also result in added trips to the roadway circulation system in other areas that could potentially affect the speed and response times of emergency vehicles and first responders, however the results of the Alternative B roadway segment analysis indicate that roadway capacity and LOS are within acceptable levels which also correlate to acceptable travel speeds.

When comparing Alternative B to existing conditions, impacts to emergency access and response times would be similar to those described in the preceding paragraphs (i.e., comparison of Alternative B to No-Action). As a result, there would be a **potentially significant** impact to the roadway circulation system.

Mitigation Measure TRA-4B (Alternative B): ***Use Construction Sequencing to Provide Continuous Emergency Access at Drive 10 ½.*** Construction activities in the Project area will be modified to provide continuous emergency access at Drive 10 ½ through construction sequencing and local emergency dispatchers will be notified of temporary road closures associated with this crossing. Implementation of this measure will reduce short-term impacts to emergency access near Drive 10 ½ during construction.

> **Implementation Action:** Provide continuous emergency access at Drive 10 ½ through construction sequencing. To continue the current level of emergency access, Drive 10 ½ will be rerouted along the bypass channel levees and cross the head of the bypass channel at the proposed Compact Bypass Bifurcation Structure prior to channel excavation at Drive 10 ½'s current alignment.
>
> **Location:** Active construction areas at Drive 10 ½.
>
> **Effectiveness Criteria:** Effectiveness will be based on access availability.
>
> **Responsible Agency:** Reclamation and the construction contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Ongoing over the construction timeframe.

No feasible mitigation exists for long-term impacts to emergency response times to areas north of the river near the San Mateo Avenue crossing. Use of alternative access routes (at Drive 10 ½) would still increase emergency response times beyond the County's 20 minutes goal for rural areas. As a result, there would be a **significant and unavoidable** impact to the roadway circulation system.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Key features of Alternative C include construction of a levee system, fish passage facilities at Mendota Dam, grade control structures downstream of Mendota Dam, a new Fresno Slough Dam, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Tables 22-11 and 22-12 summarize the results of the roadway segment analyses comparing Alternative C roadway LOS construction conditions with 2035 No-Action and existing conditions respectively. Project operations under Alternative C are anticipated to have low trip generation potential. Therefore, no LOS analyses were conducted beyond the aforementioned Alternative C construction conditions.

Table 22-11.
Roadway Segments LOS – 2035 No-Action and Alt. C Construction Conditions

Road	Description	No-Action 2035 ADTs	No-Action LOS	Alt C 2035 ADTs	Alt C 2035 LOS
Firebaugh Blvd	East of Ripperdan Avenue	3,765	A	3,765	A
Firebaugh Blvd	West if Ripperdan Avenue	6,770	A	6,770	A
Ripperdan Ave	South of Firebaugh Blvd	3,766	A	3,766	A
Bass Avenue	Bass Avenue east of SR 33	632	A	832	A
San Mateo Ave	San Mateo Avenue north of SR 180	678	A	5,061	A
S. SR 33	SR 33 south of SR 180/33 Junction	14,632	A	15,621	A
N. SR 33	SR 33 north of SR 180/33 Junction	6,944	A	7,458	A
W. SR 180	SR 180 west of San Mateo Avenue	10,168	A	11,622	B
E. SR 180	SR 180 east of San Mateo Avenue	10,168	A	11,844	B

Key:
ADT = average daily traffic
LOS = level of service
SR = State route

Table 22-12.
Roadway Segments LOS – Existing and Alt. C Project Construction Conditions

Road	Description	Existing ADTs	Existing LOS	Alt C ADTs	Alt C LOS
Firebaugh Blvd	East of Ripperdan Avenue	3,036	A	3,036	A
Firebaugh Blvd	West if Ripperdan Avenue	5,460	A	5,460	A
Ripperdan Ave	South of Firebaugh Blvd	3,037	A	3,037	A
Bass Avenue	Bass Avenue east of SR 33	510	A	710	A
San Mateo Ave	San Mateo Avenue north of SR 180	547	A	4,930	A
S. SR 33	SR 33 south of SR 180/33 Junction	11,800	A	12,789	A
N. SR 33	SR 33 north of SR 180/33 Junction	5,600	A	6,114	A
W. SR 180	SR 180 west of San Mateo Avenue	8,200	A	9,654	A
E. SR 180	SR 180 east of San Mateo Avenue	8,200	A	9,876	A

Key:
ADT = average daily traffic
LOS = level of service
SR = State route

Impact TRA-1 (Alternative C): ***Potential to Cause an Increase in Traffic which is Substantial in Relation to the Existing Traffic Load and Capacity of the Roadway System.*** Under Alternative C, the Project would be implemented and construction activities would be anticipated in the Project area. In addition, Project facilities would need to be maintained and operated. Although there would be an increase in Project-related traffic during construction, the traffic levels are still within acceptable limits in context to the roadway capacities (see Table 22-5 for roadway capacities).

When comparing Alternative C to existing conditions, impacts from construction generated trips would be similar to those described in the preceding paragraph (i.e., comparison of Alternative C to No-Action). Based on the results of the comparison of roadway segment volumes to existing conditions, there would be a **less than significant** impact to the roadway circulation system traffic loads and capacities.

Impact TRA-2 (Alternative C): ***Potential to Exceed, Either Individually or Cumulatively, a LOS Standard Established By the County Congestion Management Agency for Designated Roads or Highways.*** Compared to the No-Action Alternative, construction under Alternative C has the potential to generate additional traffic that may cause an exceedance of existing LOS standards at designated congestion management program roads or highways in the Project area. As shown in Table 22-11, none of the study roadway segment in the immediate vicinity of the Project site would experience a change to an unacceptable LOS due to construction under Alternative C.

When comparing Alternative C to existing conditions, impacts from construction generated trips would be similar to those described in the preceding paragraph (i.e., comparison of Alternative C to No-Action). Based on the results of the comparison of Alternative C LOS to existing conditions LOS, there would be a **less than significant** impact to the roadway circulation system LOS.

Impact TRA-3 (Alternative C): ***Potential to Substantially Increase Hazards to a Design Feature or Increase Incompatible Uses.*** Compared to the No-Action Alternative,

Alternative C would not cause a substantial increase in hazards due to a Project design feature or introduce incompatible use in the Project area. The Project design features would primarily be implemented in areas other than the roadway circulation system and are not intended to be used as public traveled way. In addition, Alternative C, as proposed, would not introduce hazardous design features or incompatible uses.

When comparing Alternative C to existing conditions, impacts from design features and incompatible uses would be similar to those described in the preceding paragraph (i.e., comparison of Alternative C to No-Action). As a result, there would be a **less than significant** impact to the roadway circulation system.

Impact TRA-4 (Alternative C): ***Potential to Result in Inadequate Emergency Access.*** Compared to the No-Action Alternative, Alternative C construction activities would block roadways that may affect emergency access. Construction of Alternative C would result in a temporary road closure at Drive 10 ½ and the San Mateo Avenue crossing that may affect emergency access and/or emergency response times to areas north of the river for several months.

Fresno County and Madera County fire units and emergency responders provide each other with mutual assistance. The Mendota Fire Station 96 is located within 3 miles of the Mendota Pool and is likely to provide emergency services and act as first responders in the Project area. Current estimates by the FCFPD (2007) provide for a 10 minute response time to Project areas south of the river. With the closure of Drive 10 ½ or the San Mateo Avenue crossing, emergency response times could increase by 15 minutes or more to areas immediately north of the crossing (Keenan, pers. comm. 2013). This would likely increase response times beyond the County's 20 minutes goal for rural areas.

Construction activities under Alternative C would also result in added trips to the roadway circulation system in other areas that could potentially affect the speed and response times of emergency vehicles and first responders. However, the results of the roadway segment analysis indicate that roadway capacity and LOS are within acceptable levels, which also correlate to acceptable travel speeds.

When comparing Alternative C to existing conditions, impacts to emergency access and response times would be similar to those described in the preceding paragraphs (i.e., comparison of Alternative C to No-Action). As a result, there would be a **potentially significant** short-term impact to the roadway circulation system.

Mitigation Measure TRA-4A (Alternative C): ***Provide Temporary Roadway and Crossing at San Mateo Avenue.*** Refer to Mitigation Measure TRA-4A (Alternative A). The same measure would be used here. Implementation of Mitigation Measure TRA-4A (Alternative C) will reduce short-term impacts to emergency access near San Mateo Avenue. However, no feasible mitigation exists for short-term impacts to emergency response times in areas immediately north of the river near Drive 10 ½. Use of the closest river crossing (at San Mateo Avenue) would still increase emergency response times beyond the County's 20 minutes goal for rural areas. Construction impacts associated with Drive 10 ½ would remain **significant and unavoidable**.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)
Key features of Alternative D include construction of a levee system, fish passage facilities at Mendota Dam, grade control structures downstream of Mendota Dam, Fresno Slough Dam, Main Canal and Helm Ditch relocations, and the North Canal. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Tables 22-13 and 22-14 summarize the results of the roadway segment analyses comparing Alternative D roadway LOS construction conditions with 2035 No-Action and existing conditions respectively. Project operations under Alternative D are anticipated to have low trip generation potential. Therefore, no LOS analyses were conducted beyond the aforementioned Alternative D construction conditions.

Impact TRA-1 (Alternative D): ***Potential to Cause an Increase in Traffic which is Substantial in Relation to the Existing Traffic Load and Capacity of the Roadway System.*** Under Alternative D, the Project would be implemented and construction activities would be anticipated in the Project area. In addition, Project facilities would need to be maintained and operated. Although there would be an increase in traffic during Project construction, the traffic levels would still be within acceptable limits in context to the roadway capacities (see Table 22-5 for roadway capacities).

When comparing Alternative D to existing conditions, impacts from construction generated trips would be similar to those described in the preceding paragraph (i.e., comparison of Alternative D to No-Action). Based on the results of the comparison of roadway segment volumes to existing conditions, there would be a **less than significant** impact to the roadway circulation system traffic loads and capacities.

Impact TRA-2 (Alternative D): ***Potential to Exceed, Either Individually or Cumulatively, a LOS Standard Established By the County Congestion Management Agency for Designated Roads or Highways.*** Compared to the No-Action Alternative, construction under Alternative D has the potential to generate additional traffic that may cause an exceedance of existing LOS standards at designated congestion management program roads or highways in the Project area. As shown in Table 22-7, none of the study roadway segment in the immediate vicinity of the Project site would experience a change to an unacceptable LOS due to Project construction under Alternative D.

When comparing Alternative D to existing conditions, impacts from construction generated trips would be similar to those described in the preceding paragraph (i.e., comparison of Alternative D to No-Action). Based on the results of the comparison of Alternative D LOS to existing conditions LOS, there would be a **less than significant** impact to the roadway circulation system LOS.

Table 22-13.
Roadway Segments LOS – 2035 No-Action and Alt. D Construction Conditions

Road	Description	No-Action 2035 ADTs	No-Action LOS	Alt D 2035 ADTs	Alt D 2035 LOS
Firebaugh Blvd	East of Ripperdan Avenue	3,765	A	3,765	A
Firebaugh Blvd	West if Ripperdan Avenue	6,770	A	6,770	A
Ripperdan Ave	South of Firebaugh Blvd	3,766	A	3,766	A
Bass Avenue	Bass Avenue east of SR 33	632	A	832	A
San Mateo Ave	San Mateo Avenue north of SR 180	678	A	5,055	A
S. SR 33	SR 33 south of SR 180/33 Junction	14,632	A	15,618	A
N. SR 33	SR 33 north of SR 180/33 Junction	6,944	A	7,467	A
W. SR 180	SR 180 west of San Mateo Avenue	10,168	A	11,595	B
E. SR 180	SR 180 east of San Mateo Avenue	10,168	A	11,859	B

Key:
ADT = average daily traffic
LOS = level of service
SR = State route

Table 22-14.
Roadway Segments LOS – Existing and Alt. D Project Construction Conditions

Road	Description	Existing ADTs	Existing LOS	Alt D ADTs	Alt D LOS
Firebaugh Blvd	East of Ripperdan Avenue	3,036	A	3,036	A
Firebaugh Blvd	West if Ripperdan Avenue	5,460	A	5,460	A
Ripperdan Ave	South of Firebaugh Blvd	3,037	A	3,037	A
Bass Avenue	Bass Avenue east of SR 33	510	A	710	A
San Mateo Ave	San Mateo Avenue north of SR 180	547	A	4,924	A
S. SR 33	SR 33 south of SR 180/33 Junction	11,800	B	12,786	C
N. SR 33	SR 33 north of SR 180/33 Junction	5,600	A	6,123	A
W. SR 180	SR 180 west of San Mateo Avenue	8,200	A	9,627	A
E. SR 180	SR 180 east of San Mateo Avenue	8,200	A	9,891	A

Key:
ADT = average daily traffic
LOS = level of service
SR = State route

Impact TRA-3 (Alternative D): ***Potential to Substantially Increase Hazards to a Design Feature or Increase Incompatible Uses.*** Compared to the No-Action Alternative, Alternative D would not cause a substantial increase in hazards due to a Project design feature or introduce incompatible uses in the Project area. The Project design features would primarily be implemented in areas other than the roadway circulation system and are not intended to be used as public traveled way. In addition, Alternative D, as proposed, would not introduce hazardous design features or incompatible uses.

When comparing Alternative D to existing conditions, impacts from design features and incompatible uses would be similar to those described in the preceding paragraph (i.e., comparison of Alternative D to No-Action). As a result, there would be a **less than significant** impact to the roadway circulation system.

Impact TRA-4 (Alternative D): ***Potential to Result in Inadequate Emergency Access.*** Compared to the No-Action Alternative, Alternative D could potentially result in inadequate emergency access to portions of the Project area. Alternative D would create a permanent road closure that may affect emergency access/emergency response times to areas immediately north of the San Mateo Avenue crossing. As part of this alternative, the culvert and road embankments at the San Mateo Avenue crossing would be demolished, and no river crossing would be provided at this location. Construction of Alternative D would result in a temporary road closure at Drive 10 ½ during construction of fish passage facilities at Mendota Dam.

Fresno County and Madera County fire units and emergency responders provide each other with mutual assistance. The Mendota Fire Station 96 is located within 3 miles of the Mendota Pool and is likely to provide emergency services and act as first responders in the Project area. Current estimates by the FCFPD (2007) provide for a 10 minute response time to Project areas south of the river. With the closure of Drive 10 ½ or the San Mateo Avenue crossing, emergency response times could increase by 15 minutes or more to areas immediately north of the crossing (Keenan, pers. comm. 2013). This would likely increase response times beyond the County's 20 minutes goal for rural areas.

Construction activities under Alternative D would also result in added trips to the roadway circulation system that could potentially affect the speed and response times of emergency vehicles and first responders during the construction period. However, the results of the roadway segment analysis indicate that roadway capacity and LOS are within acceptable levels, which also correlate to acceptable travel speeds.

When comparing Alternative D to existing conditions, impacts to emergency access and response times would be similar to those described in the preceding paragraphs (i.e., comparison of Alternative D to No-Action). As a result, there would be a **potentially significant and unavoidable** impact to the roadway circulation system. No feasible mitigation exists for long-term impacts to emergency response times to areas north of the river near the San Mateo Avenue crossing or for short-term impacts to emergency response times in areas near Drive 10 ½. Use of alternative access routes would increase emergency response times beyond the County's 20 minutes goal for rural areas.

23.0 Utilities and Service Systems

This chapter provides an overview of existing utilities and service systems and describes the regulatory setting, environmental consequences, and mitigation measures, where applicable, as they pertain to the Project. Many utilities and service systems are evaluated to some degree in previous chapters. A discussion of surface water resources, water distribution facilities, and operations is provided in Chapter 12.0, "Hydrology – Flood Management" and Chapter 14.0, "Hydrology–Surface Water Resources and Water Quality." Information on regional planning for systems and service growth is discussed in Chapter 16.0, "Land Use Planning and Agriculture Resources." Wildland fire hazards are discussed in Chapter 19.0, "Public Health and Hazardous Materials." Information on recreation facilities is provided in Chapter 21.0, "Recreation." Impacts of the Project on emergency response time are addressed in Chapter 22.0, "Transportation and Traffic." School services and facilities are not analyzed in this section because there would be no need for new or physically altered facilities with implementation of Project alternatives.

23.1 Environmental Setting

This section describes the environmental setting associated with utilities and service systems and public services potentially affected by Project alternatives. The utilities and public services covered in this section include wastewater collection, fire protection services, law enforcement services, emergency services, solid waste management, utility crossings (i.e., electricity and natural gas), energy, and water supply features.

23.1.1 Wastewater Collection

Sanitary sewer systems in Fresno and Madera counties are typically provided by cities and special districts, such as community service districts, public utility districts, sanitary districts, and sewer maintenance districts. Some of these entities provide sewer collection service only and contract with surrounding agencies or districts for wastewater treatment and disposal. Some unincorporated areas in Fresno and Madera counties lack sanitary sewer infrastructure and are serviced by individual or community septic systems. As noted in the Program Environmental Impact Statement/Report (PEIS/R) (San Joaquin River Restoration Program [SJRRP] 2011, page 24-2), the Reach 2B area is not served by a municipal wastewater collection system, but may be served by individual or community septic systems, inclusive of pipelines and leach fields.

23.1.2 Fire Protection Services

Fire protection services for Reach 2B are provided by the Fresno County Fire Protection District (FCFPD), the Madera County Fire Department and the California Department of Forestry and Fire Protection (CAL FIRE). A general overview of fire protection facilities and services in the Project area is provided below.

The FCFPD is the largest of five Special Districts serving unincorporated areas of Fresno County, covering 2,655 square miles and serving over 50 percent of the county, including the Project area and the cities of Parlier, Mendota, Huron, San Joaquin and the rural communities of Tranquillity, Del Rey, Caruthers, Easton, Malaga, Friant, Cantua Creek, Calwa, Prather, Sand Creek and Wonder Valley. The FCFPD has 13 fire stations and 48 personnel (FCFPD 2009).

The FCFPD, in cooperation with the CAL FIRE, provides emergency services from 18 fire stations to provide wildland fire suppression, emergency medical service, response to hazardous materials incidents, urban search and rescue, water rescue, vehicle extrication, technical rescue, basic life support medical services, and fire prevention and education to approximately 182,000 people (Fresno County 2011). Table 23-1 identifies the FCFPD and CAL FIRE stations that are within 45 miles of the Project area. Two fire stations are within 20 miles of the Project area; the remaining stations are 40 or more miles away from the Project area.

Table 23-1.
Fresno County Fire Protection District and CAL FIRE Stations Nearest to the Project Area

Fire Station	Location	Driving Distance[1]
Mendota Station 96	101 McCabe Avenue, Mendota, CA 93640	2.8 miles
Tranquillity Station 95	25101 Morton Street / P.O. Box 645, Tranquillity, CA 93668	17 miles
Harris Ranch Station	24125 West Dorris Street, Coalinga, CA 93210	42 miles
South Fresno Station 87	4706 East Drummond Avenue, Fresno, CA 93727	42 miles
Caruthers Station 90	2701 W. Tahoe Avenue, Caruthers, CA 93609	42 miles
Easton Station 89	5810 South Cherry Avenue, Fresno, CA 93706	43 miles

Source: Fresno County 2011

Notes:

[1] Distances are approximate and have been calculated from Mendota Pool to provide a reference point. Actual distance will vary from other locations within the Project area.

The Madera County Fire Department provides fire protection services to unincorporated areas of Madera County through a network of 17 fire stations, a fleet of 56 apparatus and support vehicles, and a personnel staff that includes 32 career fire suppression personnel, 175 paid on-call firefighters and 7 support personnel. The Madera County Fire Department is administered, and fire suppression personnel are provided, through a contract with the CAL FIRE Madera-Mariposa-Merced Unit. Clerical and automotive support personnel are county employees.

Table 23-2 lists the Madera County Fire Department and CAL FIRE Madera-Mariposa-Merced Unit stations that are within 40 miles of the Project area. The nearest fire station is more than 30 driving miles from the Project area.

Table 23-2.
Madera County Fire and CAL FIRE Stations Nearest to the Project Area

Fire Station	Address	Driving Distance[1]
CAL FIRE Station 4 (Dairyland volunteer station)	13802 Ave. 21 Chowchilla, CA 93610	31 miles
CAL FIRE Station 2	112 Trinity St. Chowchilla, CA 93610	36 miles
Madera Valley /CAL FIRE Madera-Mariposa-Merced Unit Station 1	14225 Road 28 Madera, CA	37 miles
CAL FIRE Station 6	317 N Lake Madera, CA 93637	37 miles

Source: Madera County 2008a

Notes:

[1] Distances are approximate and have been calculated from Mendota Pool to provide a reference point. However, distance may vary from other locations of Reach 2B.

The Madera County Fire Station that serves the Project area is the CAL FIRE Madera-Mariposa-Merced Unit (Dairyland) Station No. 4, which is located 31 driving miles northeast from the farthest point within the Project area. This is a volunteer fire station and is not staffed by paid, on-duty personnel.

The Insurance Service Organization is a private insurance research group that periodically assesses the degree to which fire threatens geographic areas. Insurance Service Organization collects information on municipal fire-protection efforts in communities throughout the United States. In each of those communities, Insurance Service Organization analyzes the relevant data using a Fire Suppression Rating Schedule and then assigns a Public Protection Classification from 1 (best protection or lowest threat) to 10 (least protection or higher threat). This rating is based on the type of vegetation or structures present, climate, and the availability of fire protection services. The Madera County General Plan Background Report (Madera County 1995, at Figure 7-4, Fire Insurance Classifications) indicates that the Project area is located in a Class 9 fire insurance area.

23.1.3 Law Enforcement Services

Law enforcement services for portions of the Project area are provided by the Fresno County Sheriff's Office, the Madera County Sheriff's Department and the California Highway Patrol (CHP). A general overview of law enforcement facilities, assets and services serving the Project area is provided below.

The Fresno County Sheriff's Office provides metropolitan and rural law enforcement services in Fresno County. This office is responsible for law enforcement services and police patrols for more than 6,000 square miles, ranging from valley farmlands to mountain peaks and including portions of the Project area within Fresno County. The

Fresno County Sheriff's Office provides the following: Vehicle Patrol, Air Support Unit (helicopters), Mounted Horse Unit, Canine Unit, Bike Unit, Boating Enforcement Unit, and numerous community programs for Crime Prevention and Youth Services.

Over 1000 employees conduct field services from four rural substations. The Fresno County Sheriff Office services are divided into four geographic areas. The Project area is in Area 1, a region of over 2,400 square miles in western Fresno County. The Area 1 substation is located 22 miles southeast of Mendota in the city of San Joaquin. Area 1 is primarily comprised of agricultural farm land with some livestock ranching. The Fresno County Sheriff's Office headquarters is located in the city of Fresno, more than 35 miles east of Mendota and 25 miles east of the near point within the Project area.

Law enforcement services for portions of the Project area in Madera County are provided by the Madera County Sheriff's Department. The Department headquarters is located in the city of Madera. The Department has 116 total personnel, with 82 sworn officers, and substations at Chowchilla, Oakhurst, Native American ranchos, and Bass Lake. The Department is divided into the Valley Division, Mountain Division, and Administrative Division. The Administrative Division oversees the offices of records, dispatch, civil process and court security.

23.1.4 Emergency Services

Emergency services for portions of the Project area are provided by the Fresno County Sheriff's Office, Madera County Sheriff's Department, and CHP.

The Fresno County Sheriff's Office coordinates emergency evacuation routes and programs for residents and businesses throughout the County. Large-scale emergency services are handled by the department in cooperation with the Federal Emergency Management Agency (FEMA); the U.S. Forest Service (USFS); the State emergency response network run by the California Governor's Office of Emergency Services (OES); CAL FIRE; CHP; and local fire departments, hospitals, and ambulance services.

The Madera County Sheriff's Department is responsible for coordinating emergency services in Madera County. Large-scale emergency services are handled by the department in cooperation with FEMA; USFS; the State emergency response network run by the OES; CAL FIRE; CHP; and local fire departments, hospitals, and ambulance services.

Madera Community Hospital is located approximately 36 miles northeast of the Project area, in Madera. In addition, Community Regional Medical Center is located approximately 39 miles east of the Project area in Fresno. Ambulance dispatch services are provided by the Emergency Medical Services Communications Center for all ambulance requests in Fresno, Kings, and Madera counties.

The CHP's Central Division provides ground and air support for emergencies along the Interstate 5 corridor, State Route 99, and other State highways throughout Fresno and Madera counties. The CHP Central Division has 15 area offices, six resident posts, two

commercial inspection facilities, 667 uniformed officers, and 226 non-uniformed personnel (CHP 2013).

23.1.5 Solid Waste Management

Solid waste services and facilities for portions of the Project area located in Fresno County are provided by the Fresno County Resources Division. Solid waste services and facilities for the Madera County portion of the Project area are provided by the Madera County Resource Management Agency.

The Fresno County Resources Division operates the County-owned American Avenue Landfill and a small transfer station at Shaver Lake. The American Avenue Landfill is a Class II and Class III landfill[1] that accepts nonhazardous and inert solid wastes and asbestos. It is permitted to accept a maximum of 2,200 tons per day of solid waste. The site has a permitted capacity of approximately 3.3 million cubic yards and a remaining capacity of 2.9 million cubic yards. The closure date of the American Avenue Landfill is anticipated to be approximately 2031 (California Department of Resources, Recycling, and Reuse [CalRecycle] 2011a). The American Avenue Landfill is located in Kerman, approximately 16 miles southeast of the Project area.

In an effort to meet the requirements of Assembly Bill (AB) 939, Fresno County banned the disposal of construction and demolition debris at the American Avenue Landfill. Contractors are required to dispose of construction-related debris at recycling/transfer station facilities located in the cities of Fresno, Cutler, and Kerman. These facilities are identified in Table 23-3.

Solid waste disposal for portions of the Project area located in Madera County is managed by the Madera County Resource Management Agency. The county owns and operates the Fairmead Sanitary Landfill (Madera County 2013). Permitted waste types at the Fairmead Sanitary Landfill are Class III nonhazardous solid waste and inert wastes and nonfriable asbestos. The Fairmead Sanitary Landfill is permitted to accept a maximum of 1,100 tons per day of solid waste. The site has a permitted maximum capacity of approximately 9.4 million cubic yards and a remaining capacity of 5.5 million cubic yards. The closure date of the Fairmead Sanitary Landfill is anticipated to be approximately 2033 (CalRecycle 2011b). The Fairmead Sanitary Landfill is located in Chowchilla, approximately 22 miles northeast of the Project area. The county does not have a post-construction or residential recycling program but does remove some post-construction wastes out of the waste stream in the Mammoth Material Recovery Facility.

[1] Class II landfill refers to a waste management units for designated waste (hazardous waste that has been granted a variance from hazardous waste management requirements or nonhazardous waste that contains pollutants that could be released in concentrations exceeding applicable water quality objectives). Class III landfill refers to landfills for nonhazardous solid waste.

Table 23-3.
Fresno County Recycling/Transfer Station Facilities

Recycling / Transfer Station	Location	Driving Distance[1]
Mid-Valley Disposal Incorporated	15300 W. Jensen Avenue, Kerman, CA 93630	24 miles
Sunset Waste Systems	2721 South Elm Avenue, Fresno, CA93706	39 miles southeast
West Coast Waste in the City of Fresno	3077 S Golden State Frontage Road, Fresno, CA 93725-2312	41 miles
Cedar Avenue Recycling/Transfer Station	3457 South Cedar Avenue, Fresno, CA 93725	41 miles southeast
Kroeker Incorporated	4627 S. Chestnut Avenue, Fresno, CA 93725	43 miles southeast
Rice Road Transfer Station (Allied Waste)	10463 N Rice Road, Fresno, CA 93730	48 miles

Source: Fresno County 2007

Notes:

[1] Distances are approximate and have been calculated from Mendota Pool to provide a reference point. However, distance would vary from other locations of Reach 2B.

23.1.6 Utility Crossings

Electricity

The production of electricity requires the consumption or conversion of energy resources, including water, wind, oil, gas, coal, solar, geothermal, and nuclear sources. Approximately 71 percent of the State's electricity supply comes from in-State sources; the rest of the State's electricity is imported and includes electricity from the Pacific Northwest and the Southwest (California Energy Commission [CEC] 2013a). Of the electricity generated in-State, 53.4 percent is generated by natural gas-fired power plants, 1.7 percent is generated by coal-fired power plants, 14.6 percent comes from large hydroelectric dams, and 15.7 percent from nuclear power plants. The remaining 14.6 percent of the in-State total electricity production is supplied by renewable sources including small hydroelectric generation (2.4 percent), biomass (2.8 percent), geothermal (6.2 percent), solar (0.4 percent) and wind (3 percent) (CEC 2013a).

California's massive electricity generation system produces more than 296,000 gigawatt hours each year that is transported over the State's 32,000 miles of transmission lines. The State's main challenge is to ensure adequate electricity supplies while reducing greenhouse gas emissions as directed by AB 32 (33 percent reduction by 2020). Since 2003, California's energy policy has recognized an electricity "loading order" as the preferred sequence for meeting electricity demands. The loading order lists energy efficiency and demand response first; renewable resources second, and clean and efficient natural gas-fired power plants third. In addition, under the Renewables Portfolio Standard, California's goal was to increase the amount of electricity generated from renewable energy resources to 20 percent by 2010 and in 2011 legislation passed that

pushes that goal to 33 percent by 2020. Currently California receives almost 14 percent of its electricity from biomass, geothermal, small hydro, wind and solar energy generators (CEC 2011a).

Pacific Gas and Electric Company (PG&E) produces and purchases electricity from both renewable and non-renewable resources, with power derived from fossil fuels, nuclear, and hydroelectric sources. PG&E has an electricity generation portfolio that totals 6,800 megawatts and consists of 44 percent hydroelectric, 54 percent nuclear from the Diablo Canyon plant, and 2 percent from fossil fuels, and this portfolio supplies about 43 percent of PG&E's demand (PG&E 2009). To meet the electricity demands of its customers, PG&E supplements its generation portfolio by procuring about 57 percent of its electricity demand from other independent power producers or co-generators, as well as from other utilities outside of the State (PG&E 2009).

PG&E-owned electrical distribution lines cross the San Joaquin River in Reach 2B and all of them are overhead. PG&E also owns underground gas transmission lines that may be located within the Project area. Potentially affected power poles and overhead lines are shown in Figure 23-1.

Natural Gas

Most of the natural gas consumed in California during 2010 was extracted from on- and off-shore sites from the Southwest (42 percent), the Rocky Mountains (23 percent), and Canada (22 percent), while the remainder is produced in California (12 percent) (CEC 2011b). Natural gas from out-of-state production basins is delivered into California via the interstate natural gas pipeline system. Although California can contractually receive natural gas from any producing region in North America, it can only import physical supplies from the three producing regions above due to current pipeline configuration.

PG&E's gas is delivered via high-pressure pipelines to its load centers with compressors used to maintain transmission pressure. The gas is then received at either an underground storage facility or redistributed through another series of pipelines. In 2006, California consumed 6,032 million cubic feet of natural gas per day. Of this, the majority (43 percent) was used for California's electricity market. Other end users of natural gas include the residential (22 percent), industrial (23 percent), and commercial (10 percent) sectors. Transportation, storage and transmission losses account for the remaining natural gas consumption (CEC 2011c).

The Gill Ranch Gas Storage Project is a joint venture between Gill Ranch Storage, LLC and PG&E for an underground natural gas storage facility and related gas pipeline and electric power line alignments. A portion of the 30-inch diameter gas pipeline is beneath the San Joaquin River within Reach 2B at a minimum depth of 5 feet from the top of the pipe (California Public Utilities Commission [CPUC] 2009).

Natural gas transmission lines in the Project area are shown on Figure 23-1.

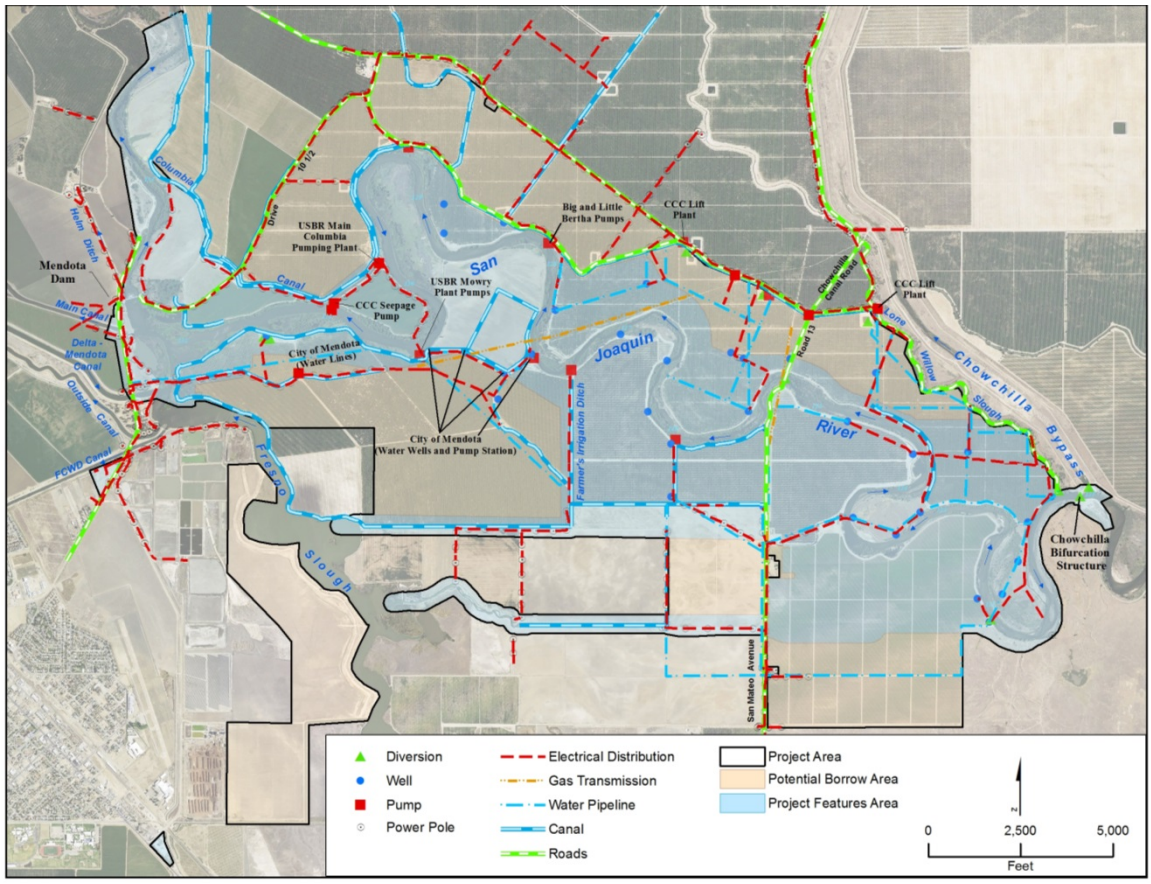

Figure 23-1.
Utilities in the Project Area

23.1.7 Energy

California's energy system includes electricity, natural gas, hydroelectric, nuclear, petroleum resources, and renewable energy. California's energy system provides 71 percent of the electricity, 12 percent of the natural gas, and 38 percent of the petroleum consumed or used for the State. The rest of the State's energy is imported and includes: natural gas purchases from Canada (22 percent) and from the Rocky Mountain States (23 percent) and the Southwest (42 percent); electricity from the Pacific Northwest (8 percent) and the Southwest – primarily coal and nuclear (21 percent); and crude oil imported from Alaska (14 percent) and foreign sources (48 percent) (CEC 2013b).

23.1.8 Water Supply Features

Flows conveyed into or diverted from Reach 2B and Mendota Pool could include:

- Interim and Restoration flows.
- Exchange Contractor deliveries to Mendota Pool from the San Joaquin River.
- Exchange Contractor deliveries to Mendota Pool from the Delta-Mendota Canal (DMC).

- Millerton Lake flood releases.
- Pine Flat Reservoir flood releases.
- Deliveries to Mendota Pool via groundwater pump-ins.
- Diversions from Mendota Pool.
- Diversions from the San Joaquin River via Lone Willow Slough and other pumps.

Mendota Pool delivers water to the San Joaquin River Exchange Contractors (Exchange Contractors) via the Main Canal, Helm Ditch, Columbia Canal, Main Lift Canal, and Outside Canal. The DMC typically conveys 2,500 to 3,000 cubic feet per second (cfs) to Mendota Pool during the irrigation season. Water deliveries from Mendota Pool are based on water surface elevation, not storage capacity.

Several water diversions, canals, lift stations, and groundwater wells exist within the Project area. Twenty-nine water diversions are located along this reach. Diversions occur from Mendota Pool via the Columbia Canal, Mendota Dam (for Arroyo Canal in Reach 3), Helm Ditch, Main Canal, Outside Canal, Fresno County Waterworks District Canal, Fresno Slough, and Mowry pumps. Diversions occur from the river via Lone Willow Slough and other pumps. Water pipelines also lie within the Project area.

The city of Mendota relies on three wells located southeast of the Mendota Pool for 100 percent of their municipal water supply. These wells produce on average approximately 2,000 acre-feet per year.

Water conveyance infrastructure, including wells, pipelines, canals and irrigation lines within the Project area is shown in Figure 23-1.

23.2 Regulatory Setting

This section describes the regulatory setting pertaining to utilities and service systems, and public services, within the Project area.

23.2.1 Federal

The following Federal laws related to utilities and service systems are applicable to Project alternatives.

Resource Conservation and Recovery Act (42 United States Code [USC] Section 6901 et seq.)

The Federal Resource Conservation and Recovery Act (RCRA) enacted in 1976 to ensure that solid and hazardous wastes are properly managed, from their generation, to ultimate disposal or destruction. Implementation of the RCRA has largely been delegated to federally approved State waste management programs and under Subtitle D, further promulgated to local governments for management of planning, regulation, and implementation of nonhazardous solid waste disposal. The U.S. Environmental Protection Agency (EPA) retains oversight of State actions under 40 Code of Federal Regulations [CFR] 239-259. Where facilities are found to be inadequate, Section 256.42

requires that necessary facilities and practices be developed by the responsible state and local agencies, or by the private sector. In California, that responsibility was created under the California Integrated Waste Management Act of 1989 and AB 939.

Energy Policy Act of 2005

The Energy Policy Act of 2005 seeks to reduce reliance on non-renewable energy resources and provide incentives to reduce current demand on these resources. For example, under the Act, consumers and businesses can attain Federal tax credits for purchasing fuel-efficient appliances and products, including buying hybrid vehicles, building energy efficient buildings, and improving the energy efficiency of commercial buildings. Additionally, tax credits are available for the installation of qualified fuel cells, stationary microturbine power plants, and solar power equipment.

23.2.2 State of California

The following State laws that pertain to utilities and service systems as discussed in this section.

California Integrated Waste Management Act

To minimize the amount of solid waste that must be disposed of by transformation and land disposal, the California Legislature passed the California Integrated Waste Management Act of 1989 (AB 939), effective January 1990. According to the California Integrated Waste Management Act, all cities and counties were required to divert 25 percent of all solid waste from landfill facilities by January 1, 1995, and 50 percent by January 1, 2000. Each city and county is required to develop solid waste plans demonstrating integration of the California Integrated Waste Management Act plan with the county plan. The plans must promote (in order of priority) source reduction, recycling and composting, and environmentally safe transformation and land disposal.

State of California Integrated Energy Policy

In 2002, the California Legislature passed Senate Bill 1389 which required the CEC to develop an integrated energy plan for electricity, natural gas, and transportation fuels, for the California Energy Report biannually. The plan calls for the State to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies a number of strategies, including assistance to public agencies and fleet operators in implementing incentive programs for Zero Emission Vehicles and their infrastructure needs, and encouragement of urban designs that reduce vehicle miles traveled and accommodate pedestrian and bicycle access.

The most recent update – the 2014 Integrated Energy Policy Report (IEPR) - was adopted by the CEC on February 25, 2015 (CEC 2015). The 2014 IEPR Update focuses on the role of transportation in meeting State climate, air quality, and energy goals; the Alternative and Renewable Fuel and Vehicle Technology Program; plug-in electric vehicle infrastructure; the state of hydrogen, zero-emission vehicle, biofuels, and natural gas technologies over the next 10 years; an update to the electricity demand forecast; and other energy issues.

Utility Notification Requirements

California law (Gov. Code, § 4216 et seq.) requires owners and operators of underground utilities to become members of and participate in a regional notification center. "Operators of subsurface installations who are members of, participate in, and share in the costs of a regional notification center, including but not limited to … Underground Service Alert --Northern California … are in compliance with this section" (Gov. Code, § 4216.1). According to Underground Service Alert North, its "purpose is to receive planned excavation reports from public and private excavators and to transmit those planned excavation reports to all participating members of Underground Service Alert North who may have underground facilities at the location of excavation. The Underground Service Alert North Members will mark or stake their facility, provide information or give clearance to dig" (Underground Service Alert North 2013).

23.2.3 Regional and Local

Fresno County General Plan

The Fresno County General Plan establishes the following goals and policies associated with public services and utilities that are relevant to the Project:

Water Supply and Delivery

- Goal PF-C: To ensure the availability of an adequate and safe water supply for domestic and agriculture consumption.
- Policy PF-C.1: Retain Existing Water Supplies. The County shall actively engage in efforts and support the efforts of others to retain existing water supplies within Fresno County.
- Policy PF-C.11: Ongoing Water Supply. The County shall assure an on-going water supply to help sustain agriculture and accommodate future growth by allocation of resources necessary to carry out the water resource management programs.
- Policy PF-C.29: Integrated Regional Water Management Planning. The County shall participate in integrated Regional Water Management Planning efforts with other local and regional water stakeholders to plan for the efficient use, enhancement, and management of surface and ground water supplies.

Storm Drainage and Flood Control

- Goal PF-E: To provide efficient, cost effective, and environmentally-sound storm drainage and flood control facilities that protect life and property and to divert and retain stormwater runoff for groundwater replenishment.
- Policy PF-E.21: Best Management Practices (BMPs). The County shall require the use of feasible and practical BMPs to protect streams from the adverse effects of construction activities, and shall encourage the urban storm drainage systems and agricultural activities to use BMPs.

Landfills, Transfer Stations, and Solid Waste Processing Facilities

- Goal PF-F: To ensure the safe and efficient disposal or recycling of solid waste generated in the county in an effort to protect the public health and safety.
- Policy PF-F.7: Existing Public Landfills. The County has designated the American Avenue Landfill as the regional landfill to serve the incorporated and unincorporated areas of the county. The publicly-operated Coalinga and Clovis landfills may continue to operate provided the sites are operated economically and in compliance with all environmental laws and regulations. Existing publicly-operated landfills may be expanded.

Law Enforcement

- Goal PF-G: To protect life and property by deterring crime and ensuring the prompt and efficient provision of law enforcement service and facility needs to meet the growing provision of law enforcement service and facility needs to meet the growing demand for police services associated with an increasing population.
- Policy PF-G.1: Effective Law Enforcement. The County shall ensure the provision of effective law enforcement services to unincorporated areas in the county.

Fire Protection and Emergency Medical Services

- Goal PF-H: To ensure the prompt and efficient provision of fire and emergency medical facility and service needs, to protect residents of and visitors to Fresno County from injury and loss of life, and to protect property from fire.
- Policy PF-H.1: Provision of Fire/Emergency Medical Service. The County shall work cooperatively with local fire protection districts to ensure the provision of effective fire and emergency medical services to unincorporated areas within the county.
- Policy PF-H.8: The County shall encourage local fire protection agencies in the county to maintain the following as minimum standards for average first alarm response times to emergency calls: (a) 5 minutes in urban areas; (b) 15 minutes in suburban areas; and (c) 20 minutes in rural areas.

Utilities

- Goal PF-J: To provide efficient and cost-effective utilities that serve the existing and future needs of people in the unincorporated areas of the county.
- Policy PF-J.1: The County shall encourage the provision of adequate gas and electric, communications, and telecommunications service and facilities to serve existing and future needs.
- Policy PF-J.2: The County shall work with local gas and electric utility companies to design and locate appropriate expansion of gas and electric systems, while

minimizing impacts to agriculture and minimizing noise, electromagnetic, visual, and other impacts on existing and future residents.

Madera County General Plan

The Madera County General Plan establishes the following goals and policies associated with public services and utilities that are relevant to the Project:

Law Enforcement, Fire, and Emergency Medical Services

- Goal 3.G: To ensure the prompt and efficient provision of law enforcement, fire, and emergency medical facility and service needs. County.
- Policy 3.G.1: The County would ensure the provision of effective law enforcement, fire, and emergency medical services to unincorporated areas.

Fire Protection Services

- Goal 3.H: To protect residents of and visitors to Madera County from injury and loss of life and to protect property and watershed resources from fires.
- Policy 3.H.2: The County would encourage local fire protection agencies in the county to maintain the following as minimum standards (expressed as average first alarm response times to emergency calls): (a) 5 minutes in urban areas; (b) 15 minutes in suburban areas; and (c) 20 minutes in rural areas.

Wastewater Collection, Treatment, and Disposal Goal 3D and Policy 3D2 promote the efficient use of water and a reduced wastewater system.

Landfills, Transfer Stations, and Solid Waste Recycling Goal 3F and Policy 3F2 promote the maximum use of solid waste source reduction, recycling, composting, and environmentally safe transformation of wastes.

Utilities Policy 3.J.1 encourages the provision of adequate gas and electric, communications, and telecommunications service and facilities to serve existing and future needs, while minimizing noise, electromagnetic, and visual impacts on existing and future residents. Policy 3.J.2 indicates that the County would work with local gas and electric utility companies to design and locate appropriate expansion of gas and electric systems.

Fresno County Groundwater Management Plan

The Fresno Area Regional Groundwater Management Plan (Fresno Irrigation District et al. 2006) presents a comprehensive strategy to enhance and maintain the quantity and quality of local groundwater resources. The plan document states that the County's groundwater-related issues can be addressed through currently available means without intrusive regulation and/or restrictions on groundwater pumping. If implemented, efforts related to conservation, water recycling, groundwater banking, management of groundwater contamination, and development of additional surface water storage can provide means to meet future increases in demand while reducing or eliminating overdraft within the County.

Madera County Groundwater Management Plan

The Madera County Integrated Regional Water Management Plan (Madera County 2008b) describes the collective approach to water management that the County and its stakeholders would use to deal with water supply, water quality, and flood management through 2030. The main objectives of the Integrated Regional Water Management Plan are water resource management optimization, evaluating and increasing water supplies, water quality protection and improvement, and flood control planning.

Specific goals for the Valley Floor region include:

- Substantial reduction or elimination of groundwater overdraft through improved management of existing water supplies and development of additional water supplies.
- Development of processes to better manage groundwater pumping.
- Incorporation of flood protection into the water management strategy.
- Maintaining and/or improving groundwater quality.
- Development of a groundwater monitoring program.

23.3 Environmental Consequences and Mitigation Measures

23.3.1 Impact Assessment Methodology

This section discusses the impact assessment methods that were applied to existing utilities and public service systems, which include wastewater collection, fire protection services, law enforcement services, emergency services, solid waste management, utility crossings, energy, and water supply diversions and systems.

The evaluation of potential impacts on utilities and public services systems was based on document reviews and available literature from the following resources:

- Documents and web-based information published by Federal, State, county, and municipal agencies.
- Consultation with appropriate agencies and utility providers.
- Aerial and ground photography of the study area and local environs.

Wastewater Collection

Existing wastewater facilities were identified within the potentially affected areas and direct (physical displacement of wastewater infrastructure) or indirect effects were evaluated using current resource data and maps.

Fire Protection, Law Enforcement, and Emergency Services

The capacity of existing fire protection services and law enforcement services to support the needs of Project construction and implementation was evaluated based on the type and quality of resources available to the Project area. The need for new or physically altered governmental facilities (e.g., the creation of new service facilities) was evaluated,

including the ability to meet Project-related fire protection, law enforcement, and emergency service needs.

Solid Waste Management

Potential disruption of solid waste services or solid waste infrastructure due to the Project was evaluated. The need for solid waste disposal services during Project construction and implementation was identified. The potential for the Project to impact the ability of Fresno or Madera County to meet AB 939, the Integrated Waste Management Act, and Fresno County's ban on the disposal of construction and demolition debris at two county-operated landfills, was also evaluated.

Utility Crossings

Effects at utility crossings were analyzed by identifying the primary ways that construction and operation of the Project alternatives could affect existing utility crossings and analyzing the potential for short- or long-term disruption of these utilities. The environmental effects of the utility relocations themselves (e.g., effects on biology, cultural resources, wetlands, etc.) were discussed in the relevant resource sections.

Energy

Energy use due to changes in Project operations was evaluated. Construction and operations/maintenance activities would cause irreversible and irretrievable commitments of nonrenewable energy resources such as gasoline and diesel fuel. The extent to which the Project alternatives would increase energy consumption would be limited, as the work requires a relatively small area.

Water Supply Features and Diversions

Effects to surface water diversion and infrastructure were evaluated for the water diversions located along Reach 2B. Qualitative descriptions and assessments were the primary analysis tool for water supply diversions. Considerations in the engineering design of infrastructure were discussed. Effects due to delivery of trucked water to transportation and traffic and to air quality are discussed in their respective sections. Changes in groundwater supply were evaluated in Chapter 13.0 "Hydrology – Groundwater."

23.3.2 Significance Criteria

The National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) significance criteria for the Public Services and Utilities section are defined below for wastewater collection, fire protection services, law enforcement services, emergency services, solid waste management, water services, utility crossings, water resources, energy resources and water supply diversions.

Pursuant to NEPA regulations (40 CFR 1500–1508), Project effects are evaluated based on the criteria of context and intensity. Context means the affected environment in which a proposed project occurs. The severity of the impact is examined in terms of the type, quality, and sensitivity of the resource involved; the location and extent of the impact; the duration of the effect (short- or long-term); and other consideration of context. Intensity means the degree or magnitude of a potential adverse effect.

An energy impact with *negligible* intensity would result in a slight, measurable increased use of energy but is very close to the existing conditions. An energy impact of *moderate* intensity is defined as measurable changes in energy consumption that can be met through existing generating facilities or new power plant facilities already approved by State and Federal regulatory agencies and scheduled to be built and operational by 2035. An energy impact of substantial intensity would deplete existing energy resource to such a degree that it would require construction and operation of new electrical generating facilities.

According to Appendix G of the State CEQA Guidelines, a significant impact on utilities and service systems, including public services, would occur if the Project would:

- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.
- Conflict with a fixed facility such as a wastewater treatment plant.
- Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.
- Have insufficient water supplies available to serve the Project from existing entitlements and resources, or need new or expanded entitlements.
- Result in a determination by the wastewater treatment provider that serves or may serve the Project that it does not have adequate capacity to serve the projected Project demand in addition to its existing commitments.
- Be served by a landfill with insufficient permitted capacity to accommodate solid waste disposal needs.
- Not comply with Federal, State, and local statutes and regulations related to solid waste.
- Result in substantial adverse physical impacts associated with either the provision of or need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for fire protection, police protection, schools, and other public facilities.

23.3.3 Impacts and Mitigation Measures

This section describes the effects that the Project alternatives would have on utilities and service systems and public services including wastewater collection, fire protection services, law enforcement services, emergency services, solid waste management, water services, utility crossings, and energy resources. These Project alternatives are described in detail in Chapter 2.0, "Description of Alternatives." This analysis of potential direct and indirect effects of the Project alternatives on utilities and public services resources is conducted relative to No-Action conditions in accordance with NEPA. In accordance

with the State CEQA Guidelines, potential Project impacts under CEQA are compared to existing conditions. The analysis is organized by Project alternative with specific environmental impact topics numbered sequentially under each alternative.

With respect to utilities and public services, the environmental impact topics considered are:

1. Increased Need for New or Physically Altered Governmental Facilities due to Reduced Emergency Access and Increased Emergency Response Times.
2. Potential for Generation of Solid Waste in the Project Area in Excess of Permitted Landfill Capacity.
3. Potential for Noncompliance with Federal, State, and Local Statutes and Regulations Related to Solid Waste.
4. Potential for Insufficient Water Supply Resources in the Project area.
5. Potential for New or Physically Altered Utility Infrastructure to Conflict with an Applicable Land Use Plan, Policy, or Regulation.
6. Effects on Energy Resources.
7. Reduced Capacity of Existing Operational Diversion Facilities.

Other utilities and service system related issues covered in the PEIS/R are not covered here because they are programmatic in nature and/or are not relevant to the Project area. This includes recapturing, reuse, and recirculation of Restoration Flows.

Issues Eliminated from Further Analysis

Increased Demand for Wastewater Treatment

Because no housing or other occupied facilities would be constructed by the Project and the Project would not cause indirect population growth, there would be no increased demand for wastewater collection systems. Restroom facilities (i.e., a structural outhouse) may be included at water control structures; however, these restrooms would be pump-out facilities with no running water. Construction activities would also require outhouse facilities. Waste generated at these facilities would be removed and disposed of at permitted disposal facilities. Therefore, construction or expansion of wastewater treatment facilities would not be necessary nor would the Project cause a reduction in the ability of existing facilities to meet wastewater treatment requirements. Furthermore, the Project would not conflict with a fixed facility such as a wastewater treatment plant. No direct or indirect effects to existing wastewater collection services would result. For these reasons, these issues are not further evaluated.

Increased Demand for Emergency Services

Because the Project alternatives would not result in direct or indirect population growth, the need for fire protection, law enforcement, and emergency medical and disaster response services would be unchanged. The increased flows and related recreation opportunities at Mendota Dam and Mendota Pool and at other river access points (such as the San Mateo Avenue crossing) could attract some additional recreationists to these

areas but not enough to expand the need for emergency services because service facilities and river access points would not change. Hence, no additional emergency service capacity would be required and there would be no need for new or altered emergency service facilities because of the Project. Therefore, issues resulting from increased demand for emergency services are not further evaluated in this section.

Increased Demand for Water Treatment

Because no housing or other occupied facilities would be constructed by the Project and the Project would not cause indirect population growth, there would be no increased demand for water treatment facilities. Restroom facilities (i.e., a structural outhouse) may be included at water control structures; however, these restrooms would be pump-out facilities with no running water. Therefore, construction of new water treatment facilities or expansion of existing facilities would not be necessary. For this reason, increased demand for water treatment facilities are not further evaluated in this section.

New Stormwater Drainage Facilities

The relocation or retrofitting of existing infrastructure affected by the Project is discussed below. The Project would not require or result in the construction of new stormwater drainage facilities or expansion of existing facilities by county agencies or others. For this reason, this issue not further evaluated in this section.

School Services

School services and facilities would not be affected by any of the Project alternatives, and new or physically altered facilities would not be needed. The Project would not generate or redistribute populations or housing; hence, school services and facilities would not be directly or indirectly affected. For this reason, school services and facilities are not further evaluated in this section.

No-Action Alternative

Under the No-Action Alternative, the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the SJRRP would be implemented, including habitat restoration in other reaches, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these activities would not achieve the Settlement goals. The potential effects of the No-Action Alternative are described below. Unless otherwise stated, conditions existing as of July 2009 were assumed to persist and the effect on those conditions associated with utility service infrastructure was analyzed. The analysis is a comparison to existing conditions, and no mitigation is required for No-Action.

Emergency Services

Impact UTL-1 (No-Action Alternative): *Increased Need for New or Physically Altered Governmental Facilities due to Reduced Emergency Access and Increased Emergency Response Times.* Emergency services are generally provided by the CHP Central Division, Madera County Sheriff's Department and the Fresno County Sheriff's Department. Large-scale emergency services are the responsibility of the Sheriff's department and FEMA, USFS, the State emergency response network overseen by the

California OES, CAL FIRE, CHP, and local fire departments, hospitals and ambulance services. Fresno County and Madera County fire units and emergency responders provide each other with mutual assistance; hence, river crossings provide access and egress for emergency responders to private property and agricultural areas along the river.

Compared to existing conditions, emergency responders may need to use alternative access routes during certain times of the year. Restoration Flows limit access at the San Mateo Avenue crossing more frequently and for longer durations during the year than existing conditions. This would cause mutual assistance emergency service providers to use alternative access routes to reach areas north of the river, such as Drive 10 ½, when flows exceed the capacity of the San Mateo Avenue crossing. Flows would typically be greater than the existing culvert capacity (150 cfs) during November to April.

Although emergency response times to areas north of the river would be increased for a portion of the year, the creation of new fire stations or the expansion of existing stations would be unlikely to be influenced by this access limitation. The expansion of existing facilities and the siting of new firefighting stations occur in response to new growth areas (Madera County 2008a). The release of Restoration Flows would not increase population growth in the Project area or vicinity, and therefore effects would be negligible. This impact would be **less than significant**.

Solid Waste Management

Impact UTL-2 (No-Action Alternative): *Potential for Generation of Solid Waste in the Project Area in Excess of Permitted Landfill Capacity.* None of the Project facilities would be built under the No-Action Alternative and there would be no change in the long-term or short-term generation of solid waste within the Project area. Therefore, compared to existing conditions, no additional use or disruption of solid waste services or infrastructure would occur. There would be **no impact**.

Impact UTL-3 (No-Action Alternative): *Potential for Noncompliance with Federal, State, and Local Statutes and Regulations Related to Solid Waste.* None of the Project facilities would be built under the No-Action Alternative and there would be no change in generation of solid waste within the Project area. Compared to existing conditions, no additional use or disruption of solid waste services or infrastructure would occur. Consequently, no change would occur in the ability of the Fresno County Resources Division and the Madera County Resource Management Agency to abide by the mandates of AB 939 to reduce waste being disposed and plans for solid waste facility and landfill compliance. This includes Fresno County General Plan policies for safe and efficient disposal or recycling of solid waste, and the Fresno County Code, Title 8, banning the disposal of construction and demolition debris at the American Avenue and Coalinga Landfills.

As described above, no additional solid waste would be generated under the No-Action Alternative and no Project-related impact to Federal, State and local statutes and regulations pertaining to waste disposal would result. There would be **no impact**.

Water Services

Impact UTL-4 (No-Action Alternative): ***Potential for Insufficient Water Supply Resources in the Project Area.*** This discussion identifies the potential effects on water services for the Project area under the No-Action Alternative (Water Supply Diversions are discussed separately below). The No-Action Alternative includes Restoration Flows in Reach 2B, limited by the than-existing conveyance capacity of the reach. These flows would occur within the existing levee alignment.

The city of Mendota water wells east of Mendota Pool, and various irrigation canals, pump stations and individual groundwater wells, pipelines and monitoring wells would be unaffected by Project actions under the No-Action Alternative. Restoration Flows would not adversely affect the ability to operate existing wells, pipelines, canals, and pump stations in the Project area. Efforts to meet goals and policies found in the Madera County AB3030 Groundwater Management Plan (Madera County 2002), the Fresno County Groundwater Management Plan (Fresno Irrigation District et al. 2006) and the Fresno County General Plan (Fresno County 2000) that are associated with public water supply and management would not be altered. No new or expanded entitlements would be required.

No change in public water supply or water supply resources would occur under the No-Action Alternative beyond those previously analyzed in the PEIS/R (e.g., the release of Interim and Restoration flows and the recapture, reuse, and recirculation of those flows in the Restoration Area). There would be no change in the ability to operate existing wells, pipelines, and pump stations in the Project area. No impact to Federal, State and local statutes and regulations pertaining public water supply would result. There would be **no impact**.

Utility Crossings

Impact UTL-5 (No-Action Alternative): ***Potential for New or Physically Altered Utility Infrastructure to Conflict With An Applicable Land Use Plan, Policy, or Regulation.*** Under the No-Action Alternative, there would be no Project-related conflicts with existing infrastructure, such as gas and electrical service lines and telephone or cable communication infrastructure, and therefore policies and regulations regarding construction or modification of electric transmission, power, or distribution lines would not be applicable. Existing conditions would remain and any new construction would be required to abide by the current regulations. There would be **no impact**.

Energy Resources

Impact UTL-6 (No-Action Alternative): ***Effects on Energy Resources.*** The No-Action Alternative would include routine operations and maintenance of existing water control infrastructure. Energy use is primarily from the burning of fossil fuels such as diesel and standard gasoline to power construction equipment and vehicles. The amount and type of fuels required for periodic maintenance of the existing system would be minimal and would not impact energy resources including local and regional energy supplies, or need for added energy capacity; would not impact peak and base period energy demand for electricity, or other forms of energy; would not exceed existing energy standards; and would not impact transportation energy use. The extent to which the No-Action

Alternative would increase energy consumption would be limited; hence, energy consumption under the No-Action Alternative would be similar to existing conditions. There would be **no impact**.

Water Supply Diversions

Impact UTL-7 (No-Action Alternative): *Reduced Capacity of Existing Operational Diversion Facilities.* The No-Action Alternative includes Restoration Flows in Reach 2B, limited by the than-existing conveyance capacity of the reach. These flows would occur within the existing levee alignment. The No-Action Alternative would not reduce the capacity of existing operational diversion facilities such as lift pumps and canals and Restoration Flows would not adversely affect the ability to operate existing wells, pipelines, canals, and pump stations in the Project area. No change to water supply diversions would result under the No-Action Alternative in comparison to existing conditions. There would be **no impact**.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)

Alternative A would include construction of Project facilities including a Compact Bypass channel, a levee system encompassing the existing river channel in a narrow floodplain, and the South Canal. Other key features include construction of the Mendota Pool dike (separating the San Joaquin River and Mendota Pool), a fish barrier below Mendota Dam, and the South Canal bifurcation structure with fish passage facility and fish screens, modification of the San Mateo Avenue crossing, and the removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Emergency Services

Impact UTL-1 (Alternative A): *Increased Need for New or Physically Altered Governmental Facilities due to Reduced Emergency Access and Increased Emergency Response Times.* Compared to the No-Action Alternative, Project activities under Alternative A would not change long-term emergency services provided by the CHP Central Division, Madera County Sheriff's Department, Fresno County Sheriff's Department, CAL FIRE and local fire departments and ambulance services or generally impair the long-term ability of local agencies to respond to an emergency. However, Fresno County and Madera County fire units and emergency responders provide each other with mutual assistance; hence, river crossings provide access and egress for emergency responders to private property and agricultural areas along the river.

Alternative A would result in a roadway discontinuity at Drive 10 ½ that may affect emergency access and/or emergency response times in areas north of the river near the existing crossing. The Compact Bypass would cross the existing Drive 10 ½, which provides access to the east side of Mendota Dam. With this alternative, the road would end at the east side of the bypass channel and would not continue to Mendota Dam. Alternative A would also result in a temporary road closure at the San Mateo Avenue crossing that may affect emergency access and/or emergency response times to areas north of the river for several months. The permanent roadway discontinuity at Drive 10 ½ and the temporary removal of the San Mateo Avenue crossing would limit access and egress and could affect the ability to provide rapid response from emergency responders

to private property, agricultural areas and recreationists along the north side of the river. Reducing access to this area has the potential to adversely impact the ability of fire unit and emergency responders to provide timely medical assistance or response to a rapidly spreading vegetation fire.

Although emergency response times to areas north of the river would be increased, the creation of new fire stations or the expansion of existing stations would be unlikely to be influenced by this access limitation. The expansion of existing facilities and the siting of new firefighting stations occur in response to new growth areas (Madera County 2008a). Alternative A would not increase population growth in the Project area or vicinity, and therefore effects would be negligible.

When comparing Alternative A to existing conditions, impacts would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). Impacts would be **less than significant**.

Solid Waste Management

Impact UTL-2 (Alternative A): ***Potential for Generation of Solid Waste in the Project Area in Excess of Permitted Landfill Capacity.*** Construction for Alternative A would result in earthmoving activities for levees, canals, and various structural additions and improvements within the Project area. Demolition and removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure and replacement of the San Mateo Avenue crossing at the San Joaquin River would result in small amounts of solid waste removal from the Project area. These wastes would be removed for recycling or disposal in municipal landfills that accept construction and demolition materials. Solid waste landfills or transfer stations nearest to the Project area that accept construction and demolition waste include the Mid-Valley Disposal Transfer Station in Kerman, Fresno County located about 24 miles from the Mendota Pool, and the Fairmead Landfill located in Chowchilla, Madera County, which also approximately 24 miles northeast of the Mendota Pool.

During operation and maintenance activities for Alternative A, debris that collects on trash racks, screens, ladders, or other fish passage structures would be periodically removed. Annual maintenance cleaning would occur after the fish migration and when flows have receded.

Existing capacities of prospective solid waste landfills, transfer stations and service providers (provided in Section 23.1.5) are adequate to receive the small amounts of solid wastes removed from the Project area during construction, operation, and maintenance activities; no new solid waste facilities or infrastructure would be required. No change in the ability of Fresno or Madera County to meet AB 939, the Integrated Waste Management Act, including Fresno County's ban on the disposal of construction and demolition debris at two county-operated landfills would occur. Compared to the No-Action Alternative, no direct or indirect effects to existing solid waste services would result due to implementation of Alternative A.

When comparing Alternative A to existing conditions, impacts would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). The potential volume of solid waste that would be generated under Alternative A is substantially below permitted landfill capacities at affected landfills and transfer stations. No Project-related impact to pertaining waste disposal in excess of landfill capacity would result. There would be **no impact**.

Impact UTL-3 (Alternative A): ***Potential for Noncompliance with Federal, State, and Local Statutes and Regulations Related to Solid Waste.*** Substantial amounts of non-recyclable solid waste would not be generated under Alternative A. Demolition would result in small amounts of solid waste removal from the Project area which would be disposed of in a permitted landfill. Annual maintenance cleaning would also remove small amounts of trash and sediments from the Project area. There would be no conflict with Fresno County General Plan policies for safe and efficient disposal or recycling of solid waste, nor a conflict with Fresno County Code, Title 8, banning the disposal of construction and demolition debris at the American Avenue and Coalinga Landfills. Consequently, no change in the ability of Fresno or Madera County to meet AB 939, the Integrated Waste Management Act, would occur.

No Project-related impact to Federal, State and local statutes and regulations pertaining waste disposal would result, in comparison to No-Action or existing conditions. There would be **no impact**.

Water Services

Water resource infrastructure within the Project area has been identified. Under Alternative A, various regional irrigation canals, pump stations and individual groundwater wells, pipelines and monitoring wells could be affected. Water supply and water conveyance infrastructure that could potentially be affected by Alternative A and other Project alternatives are identified in Table 23-4.

Table 23-4.
Potentially Affected Water Resource Infrastructure

Utility	Alt A	Alt B	Alt C	Alt D	Action
Major Water Infrastructure					
Chowchilla Bifurcation Structure	1 EA	1 EA	1 EA	1 EA	Modify or Remove portion
San Mateo Avenue Culvert	1 EA	1 EA	1 EA	1 EA	Replace or Remove
Lone Willow Slough Diversion	1 EA	1 EA	1 EA	1 EA	Modify
CCC (Bend 10)	2,500 feet	2,500 feet	2,500 feet	2,500 feet	Relocate/Modify
CCID (Main Canal and Helm Ditch)	-	-	2,400 feet	2,400 feet	Relocate/Modify
Mendota Dam	-	-	1 EA	1 EA	Modify
CCC (Pump Station	2,200 feet	2,200 feet	2,200 feet	2,200 feet	Relocate/Modify

Table 23-4.
Potentially Affected Water Resource Infrastructure

Utility	Alt A	Alt B	Alt C	Alt D	Action
and Canal)					
City of Mendota Wells	3	3	3	3	Avoid, Modify, or Relocate
Minor Water Infrastructure					
Irrigation Canals	32,500 feet	31,500 feet	32,500 feet	56,000 feet	Relocate
Pump Stations	10 EA	10 EA	10 EA	10 EA	Relocate
Groundwater Wells	26 EA	32 EA	25 EA	32 EA	Modify
Water Pipelines	31,000 feet	41,000 feet	33,000 feet	50,000 feet	Abandon
Monitoring Wells	-	1 EA	-	-	Abandon

Key:
Alt = Alternative
CCC = Columbia canal
CCID = Central California Irrigation District

Impact UTL-4 (Alternative A): ***Potential for Insufficient Water Supply Resources in the Project Area.*** In comparison to the No-Action Alternative, various regional irrigation canals, pump stations and individual groundwater wells, pipelines and monitoring wells would be affected under Alternative A. As part of the Project, approximately 32,500 linear feet of irrigation canals and 10 water pump stations would be relocated. Twenty-six groundwater wells would be modified by flood proofing using berms or by raising pumps and approximately 31,000 linear feet of water pipelines would be abandoned (see Table 23-4). Flood-proofed wells would be provided with year-round vehicular access via a raised roadbed across the floodplain. Three city of Mendota water wells east of the Mendota Pool would be avoided, flood-proofed, protected, or relocated. The proposed replacement, relocation, or protection of existing water supply infrastructure would not result in a substantial change in public water supply reliability or water supply resources.

Water supplies needed by the Project to irrigate restoration plantings would be acquired from willing sellers. Therefore sufficient water supplies would be available to serve the Project from existing entitlements and resources (including water purchases from willing sellers); new or expanded entitlements are not required.

Efforts to meet goals and policies found in the Madera County AB3030 Groundwater Management Plan (Madera County 2002), the Fresno County Groundwater Management Plan (Fresno Irrigation District et al. 2006) and the Fresno County General Plan (Fresno County 2000) and are associated with public water supply and management would not be altered. Substantial direct or indirect effects to existing water services would not occur due to implementation of Alternative A. No conflicts with Federal, State and local statutes and regulations pertaining public water supply would result.

When comparing Alternative A to existing conditions, impacts would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). This impact would be **less than significant**.

Utility Crossings

Electric and natural gas utility infrastructure within the Project area has been identified. Table 23-5 lists the length of the overhead electrical utilities, the number of electrical power support poles and the length of natural gas pipeline for potentially affected infrastructure for Alternative A and other Project alternatives.

Table 23-5.
Potentially Affected Electric and Gas Infrastructure

Utility	Alternative A	Alternative B	Alternative C	Alternative D
Electrical Overhead Utilities	43,500 feet	48,500 feet	48,000 feet	68,000 feet
Gas Pipelines	10,000 feet	11,000 feet	9,000 feet	11,500 feet
Power Poles (each)	144	162	166	239

Impact UTL-5 (Alternative A): ***Potential for New or Physically Altered Utility Infrastructure to Conflict With An Applicable Land Use Plan, Policy, or Regulation.*** In contrast to the No-Action Alternative, up to 43,500 linear feet of electrical overhead utility lines,144 utility poles, and 11,000 linear feet of gas pipeline within the Project area could be affected by Project construction activities (see Table 23-5). Electrical lines from nearby power poles would also be extended to water control structures to facilitate gate and fish screen operations.

To minimize and avoid disruption of subsurface utilities from ground disturbing activities, Project proponents would confirm the location of existing underground utilities; coordinate with the owners of transmission lines and pipelines; design restoration actions to avoid affecting underground facilities, if feasible; and coordinate with the utility owner to shut off and relocate the utilities, if necessary. This is consistent with the environmental commitments specified in the PEIS/R.

The location of public utilities would be confirmed and appropriate notifications would be made by contacting utility (power and communication utility service, and irrigation district service) providers who operate, maintain or own utilities in the Project area. Short-term effects to utility services may result from modifications or replacements; however, interruption of services would be minimal because replacement lines would typically be constructed prior to disconnecting services in existing lines.

Construction contractors will request an underground service alert from Underground Service Alert North in advance of earthmoving activities to locate and avoid underground utilities. Should previously unidentified underground utility facilities be present, the contractor would coordinate with the transmission line or pipeline owner to obtain design specifications of underground facilities, avoid affecting underground utility facilities, or if necessary, coordinate with the utility owner to shut off and relocate the utilities.

County policies regarding utilities are described in the Fresno County and Madera County General Plans. The extension of electrical utilities to Project facilities is consistent with these policies. The CPUC sets forth provisions for public electric utilities

regulated under its General Order 131-D that the utility provider must adhere to when constructing or modifying public electric utilities. No conflicts with CPUC requirements are anticipated.

When comparing Alternative A to existing conditions, impacts would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). Utility relocations would not conflict with applicable land use plans, policies, or regulations. Impacts would be **less than significant**.

Energy Resources

Impact UTL-6 (Alternative A): ***Effects on Energy Resources.*** Energy use for the construction phase of the Project is primarily from the burning of fossil fuels such as diesel and standard gasoline to power construction equipment and vehicles. A majority of construction vehicle and equipment usage would be within Project ground disturbing areas. Trips outside of these areas would be limited to initial and final equipment mobilization to and from the Project area, haul vehicles, and trips by workers commuting to and from the Project area during work days.

Energy use during the operational and maintenance phase of the Project would primarily be from vehicles traveling to and from the Project area and from the electricity use at water control structures and fish passage facilities by gates and screens. The number of worker trips needed for operational and maintenance activities would be minor (e.g., estimated at a maximum of eight trips per day) and the amount of electrical usage by gates and screens is small and periodic as compared to other water infrastructure such as continuous pumps.

In comparison to the No-Action Alternative, sources of energy and infrastructure would primarily be required during the construction phase of the Project, for the use of construction vehicles and earthmoving equipment (e.g., during construction of the Compact Bypass, fish passage facilities, fish screens, and seasonal barriers; establishing low-flow channels; and constructing levees). These construction activities would result in irreversible and irretrievable commitments of nonrenewable energy resources such as gasoline and diesel fuel. However, the transportation energy effects would occur only for the duration of the construction and be intermittent. No substantial direct or indirect effects to existing energy resources would result due to implementation of Alternative A.

When comparing Alternative A to existing conditions, impacts would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). The use of petroleum fuels to complete these trips and work on-site would represent a less than significant impact, as the work would occur only for the duration of the construction and would be conducted within a relatively small area. The extent to which Alternative A would increase energy consumption from other sources is minor. The amount and type of fuels expended during the construction period would not cause a significant impact to energy resources including local and regional energy supplies, or need for added energy capacity; would not cause a significant impact to peak and base period energy demand for electricity, or other forms of energy; would not exceed existing

energy standards; and would not cause a significant impact to transportation energy use. The impact would be **less than significant**.

Water Supply Diversions

Impact UTL-7 (Alternative A): ***Reduced Capacity of Existing Operational Diversion Facilities.*** The Project is designed to convey water to Mendota Pool to accommodate contractual obligations for water deliveries to the Exchange Contractors on an as needed basis. Because conveyance of water deliveries to Mendota Pool is incorporated as part of the Project design, Project infrastructure would not inhibit these water supply deliveries. (The normal delivery mechanism for water deliveries to the Exchange Contractors is the DMC.)

Compared to the No-Action Alternative, Alternative A would change water surface elevations in the San Joaquin River arm of Mendota Pool. However, implementation of Alternative A would not reduce the capacity of operational diversion facilities because existing lift pumps would be relocated or flood-proofed by the Project. No substantial short- or long-term effects under Alternative A would result.

When comparing Alternative A to existing conditions, impacts would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). The impact would be **less than significant**.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B would include construction of Project features including a Compact Bypass channel, a new levee system with a wide, consensus-based floodplain encompassing the river channel, and the Compact Bypass Bifurcation Structure with fish passage facility. Other key features include construction of a fish passage facility at the Chowchilla Bifurcation Structure, the re-route of Drive 10 ½ (across the Compact Bypass control structure), and removal of San Mateo Avenue crossing. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Emergency Services

Impact UTL-1 (Alternative B): ***Increased Need for New or Physically Altered Governmental Facilities due to Reduced Emergency Access and Increased Emergency Response Times.*** Refer to Impact UTL-1 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A with the exception that the roadway discontinuity would occur at the San Mateo Avenue crossing. Under Alternative B, the removal of the San Mateo Avenue crossing and temporary construction effects associated with the re-route of Drive 10 ½ would limit access and egress and could limit the ability to provide rapid response from emergency responders to private property, agricultural areas and recreationists along the north side of the river near the crossing. Although emergency response times to areas north of the river would be increased, the creation of new fire stations or the expansion of existing stations would be unlikely to be influenced by this access limitation. The expansion of existing facilities and the siting of new firefighting stations occur in response to new growth areas (Madera County 2008a). Alternative B would not increase population growth in the Project area or

vicinity, and therefore effects would be negligible. Impacts would be **less than significant**.

Solid Waste Management

Impact UTL-2 (Alternative B): *Potential for Generation of Solid Waste in the Project Area in Excess of Permitted Landfill Capacity.* Refer to Impact UTL-2 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. Existing capacity of prospective solid waste landfills, transfer stations and service providers are adequate to receive wastes removed from the Project area during construction, operation and maintenance activities; no new solid waste facilities or infrastructure would be required. The potential volume of solid waste that would be generated under Alternative B is substantially below permitted landfill capacities at affected landfills and transfer stations. Therefore, no Project-related impact to pertaining waste disposal in excess of landfill capacity would result. There would be **no impact**.

Impact UTL-3 (Alternative B): *Potential for Noncompliance with Federal, State, and Local Statutes and Regulations Related to Solid Waste.* Refer to Impact UTL-3 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. Substantial amounts of non-recyclable solid waste would not be generated under Alternative B. The Project is not in conflict with Federal, State and local statutes and regulations pertaining waste disposal. There would be **no impact**.

Water Services

Under Alternative B, various regional irrigation canals, pump stations and individual groundwater wells, pipelines and monitoring wells would be affected. As part of the Project, approximately 31,500 linear feet of irrigation canals and 10 water pump stations would be relocated. Thirty-two groundwater wells would be modified by flood proofing using berms or by raising pumps and approximately 41,000 linear feet of water pipelines would be abandoned (see Table 23-4). Flood-proofed wells would be provided with year-round vehicular access via a raised roadbed across the floodplain. One monitoring well would be abandoned. Three city of Mendota water wells east of the Mendota Pool would be avoided, flood-proofed, protected, or relocated.

Impact UTL-4 (Alternative B): *Potential for Insufficient Water Supply Resources in the Project Area.* Refer to Impact UTL-4 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. Replacement, relocation, or protection of existing water supply infrastructure would not result in a substantial change in public water supply reliability or water supply resources. This impact would be **less than significant**.

Utility Crossings

Under Alternative B, approximately 48,500 linear feet of electrical overhead utility lines and 162 utility poles could be replaced. Approximately 11,000 linear feet of gas pipeline within the Project area could also be affected (see Table 23-5).

Impact UTL-5 (Alternative B): *Potential for New or Physically Altered Utility Infrastructure to Conflict With An Applicable Land Use Plan, Policy, or Regulation.*

Refer to Impact UTL-5 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. Utility relocations would not conflict with applicable land use plans, policies, or regulations. No conflict with CPUC requirements or local jurisdiction policies would result under Alternative B. Impacts would be **less than significant**.

Energy Resources

Impact UTL-6 (Alternative B): ***Effects on Energy Resources.*** Refer to Impact UTL-6 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. The amount and type of fuels expended during the construction period would not cause a significant impact to energy resources including local and regional energy supplies, or need for added energy capacity; would not cause a significant impact to peak and base period energy demand for electricity, or other forms of energy; would not exceed existing energy standards; and would not cause a significant impact to transportation energy use. Impacts would be **less than significant**.

Water Supply Diversions

Impact UTL-7 (Alternative B): ***Reduced Capacity of Existing Operational Diversion Facilities.*** Refer to Impact UTL-7 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. The alternative would allow for water deliveries from the San Joaquin River to Mendota Pool and existing lift pumps would be relocated or flood-proofed. Impacts would be **less than significant**.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C would include construction of Project features including Fresno Slough Dam, a new levee system with a narrow floodplain encompassing the river channel, and the Short Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the Short Canal control structure and fish screen, the Chowchilla Bifurcation Structure fish passage facility, modification of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Emergency Services

Impact UTL-1 (Alternative C): ***Increased Need for New or Physically Altered Governmental Facilities due to Reduced Emergency Access and Increased Emergency Response Times.*** Refer to Impact UTL-1 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A with the exception of the discontinuity at Drive 10 ½. Under Alternative C, improvement or construction activities would not impair the long-term ability of local agencies to respond to an emergency. However, construction of fish passage facilities at Mendota Dam and the temporary removal of the San Mateo Avenue crossing would limit access and egress and could limit the ability of emergency responders to provide rapid response to private property, agricultural areas and recreationists along the north side of the river near the crossing. Although emergency response times to areas north of the river would be increased, the creation of new fire stations or the expansion of existing stations would be unlikely to be influenced by this access limitation. The expansion of existing facilities and the siting of new firefighting stations occur in response to new growth areas (Madera

County 2008a). Alternative C would not increase population growth in the Project area or vicinity, and therefore effects would be negligible. Impacts would be **less than significant**.

Solid Waste Management

Impact UTL-2 (Alternative C): *Potential for Generation of Solid Waste in the Project Area in Excess of Permitted Landfill Capacity.* Refer to Impact UTL-2 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A. The potential volume of solid waste that would be generated under this alternative is substantially below permitted landfill capacities at affected landfills and transfer stations; therefore, no Project-related impact to pertaining waste disposal in excess of landfill capacity would result. There would be **no impact**.

Impact UTL-3 (Alternative C): *Potential for Noncompliance with Federal, State, and Local Statutes and Regulations Related to Solid Waste.* Refer to Impact UTL-3 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A. The Project is not in conflict with Federal, State and local statutes and regulations pertaining waste disposal. There would be **no impact**.

Water Services

Under Alternative C, various regional irrigation canals, pump stations and individual groundwater wells, pipelines and monitoring wells would be affected. As part of the Project, approximately 32,500 linear feet of irrigation canals and 10 water pump stations would be relocated. Twenty-five groundwater wells would be modified by flood proofing using berms or by raising pumps and approximately 33,000 linear feet of water pipelines would be abandoned (see Table 23-4). Flood-proofed wells would be provided with year-round vehicular access via a raised roadbed across the floodplain. Three city of Mendota water wells east of the Mendota Pool would be avoided, flood-proofed, protected, or relocated.

Impact UTL-4 (Alternative C): *Potential for Insufficient Water Supply Resources in the Project Area.* Refer to Impact UTL-4 (Alternative A). Replacement, relocation, or protection of existing water supply infrastructure would not result in a substantial change in public water supply reliability or water supply resources. Potential impacts of Alternative C would be the same as potential impacts of Alternative A. This impact would be **less than significant**.

Utility Crossings

Under Alternative C, approximately 48,000 linear feet of electrical overhead utility lines and 166 utility poles could be replaced. Approximately 9,000 linear feet of gas pipeline within the Project area could also be affected (see Table 23-5).

Impact UTL-5 (Alternative C): *Potential for New or Physically Altered Utility Infrastructure to Conflict With An Applicable Land Use Plan, Policy, or Regulation.* Refer to Impact UTL-5 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A. Utility relocations would not conflict with

applicable land use plans, policies, or regulations. Impacts would be **less than significant**.

Energy Resources

Impact UTL-6 (Alternative C): ***Effects on Energy Resources.*** Refer to Impact UTL-6 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A. The amount and type of fuels expended during the construction period would not cause a significant impact to energy resources including local and regional energy supplies, or need for added energy capacity; would not cause a significant impact to peak and base period energy demand for electricity, or other forms of energy; would not exceed existing energy standards; and would not cause a significant impact to transportation energy use. Impacts would be **less than significant**.

Water Supply Diversions

Impact UTL-7 (Alternative C): ***Reduced Capacity of Existing Operational Diversion Facilities.*** Refer to Impact UTL-7 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A with the exception that Mendota Pool would be restricted to the Fresno Slough arm. The alternative would allow for water deliveries from the San Joaquin River to Mendota Pool and existing lift pumps would be relocated or flood-proofed. Impacts would be **less than significant**.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D would include construction of Project features including Fresno Slough Dam, a new levee system with a wide floodplain encompassing the river channel, and the North Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the North Canal bifurcation structure and North Canal fish passage facility, removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure, removal of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Emergency Services

Impact UTL-1 (Alternative D): ***Increased Need for New or Physically Altered Governmental Facilities due to Reduced Emergency Access and Increased Emergency Response Times.*** Refer to Impact UTL-1 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A with the exception that the roadway discontinuity would occur at the San Mateo Avenue crossing. Under Alternative D, the removal of the San Mateo Avenue crossing and temporary construction effects associated with Drive 10 ½ would limit access and egress and could limit the ability to provide rapid response from emergency responders to private property, agricultural areas and recreationists along the north side of the river near the crossing. Although emergency response times to areas north of the river would be increased, the creation of new fire stations or the expansion of existing stations would be unlikely to be influenced by this access limitation. The expansion of existing facilities and the siting of new firefighting stations occur in response to new growth areas (Madera County 2008a). Alternative D would not increase population growth in the Project area or

vicinity, and therefore effects would be negligible. Impacts would be **less than significant**.

Solid Waste Management

Impact UTL-2 (Alternative D): *Potential for Generation of Solid Waste in the Project Area in Excess of Permitted Landfill Capacity.* Refer to Impact UTL-2 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A. The potential volume of solid waste that would be generated under this alternative is substantially below permitted landfill capacities at affected landfills and transfer stations; therefore, no Project-related impact to pertaining waste disposal in excess of landfill capacity would result. There would be **no impact**.

Impact UTL-3 (Alternative D): *Potential for Noncompliance with Federal, State, and Local Statutes and Regulations Related to Solid Waste.* Refer to Impact UTL-3 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A. The Project is not in conflict with Federal, State and local statutes and regulations pertaining waste disposal. There would be **no impact**.

Water Services

Under Alternative D, various regional irrigation canals, pump stations and individual groundwater wells, pipelines and monitoring wells would be affected. As part of the Project, approximately 56,000 linear feet of irrigation canals and 10 water pump stations would be relocated. Thirty-two groundwater wells would be modified by flood proofing using berms or by raising pumps and approximately 50,000 linear feet of water pipelines would be abandoned. Flood-proofed wells would be provided with year-round vehicular access via a raised roadbed across the floodplain. Three city of Mendota water wells east of the Mendota Pool would be avoided, flood-proofed, protected, or relocated.

Impact UTL-4 (Alternative D): *Potential for Insufficient Water Supply Resources in the Project Area.* Refer to Impact UTL-4 (Alternative A). Replacement, relocation, or protection of existing water supply infrastructure would not result in a substantial change in public water supply reliability or water supply resources. Potential impacts of Alternative D would be the same as potential impacts of Alternative A. This impact would be **less than significant**.

Utility Crossings

Under Alternative D, approximately 68,000 linear feet of electrical overhead utility lines and 239 utility poles could be replaced. Approximately 11,500 linear feet of gas pipeline within the Project area could also be affected (see Table 23-5).

Impact UTL-5 (Alternative D): *Potential for New or Physically Altered Utility Infrastructure to Conflict With An Applicable Land Use Plan, Policy, or Regulation.* Refer to Impact UTL-5 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A. Utility relocations would not conflict with applicable land use plans, policies, or regulations. Impacts would be **less than significant**.

Energy Resources

Impact UTL-6 (Alternative D): *Effects on Energy Resources.* Refer to Impact UTL-6 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A. The amount and type of fuels expended during the construction period would not cause a significant impact to energy resources including local and regional energy supplies, or need for added energy capacity; would not cause a significant impact to peak and base period energy demand for electricity, or other forms of energy; would not exceed existing energy standards; and would not cause a significant impact to transportation energy use. Impacts would be **less than significant**.

Water Supply Diversions

Impact UTL-7 (Alternative D): *Reduced Capacity of Existing Operational Diversion Facilities.* Refer to Impact UTL-7 (Alternative A). Potential impacts of Alternative D would be the same as potential impacts of Alternative A with the exception that Mendota Pool would be restricted to the Fresno Slough arm. The alternative would allow for water deliveries from the San Joaquin River to Mendota Pool and existing lift pumps would be relocated or flood-proofed. Impacts would be **less than significant**.

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24.0 Visual Resources

This chapter evaluates the potential effects of the Project on visual resources in the Project area. First, information is presented on existing visual resources and activities known to occur in proximity to Reach 2B of the San Joaquin River. The information is based on site visits, technical documents, and local and regional plans in the area. Using this information as context, the analysis of visual-related impacts of the Project is presented based on the characteristics of the Project alternatives including the character, Project exposure, and existing visual conditions.

24.1 Environmental Setting

The visual resources of an area include the features of its landforms, vegetation, water surfaces, and cultural modifications (physical changes caused by human activities) that give the landscape its inherent visual qualities. Landscape features, natural appearing or otherwise, form the overall impression of an area. This impression is referred to as "visual character." Visual character is studied as a point of reference to assess whether a given project/action would appear compatible with the established features of the setting or would contrast noticeably and unfavorably with them.

Visual resources also have a social setting, which includes public expectations, values, goals, awareness, and concern regarding visual quality. This social setting is addressed as "visual sensitivity," the relative degree of public interest in visual resources and concern over adverse changes in the quality of that resource. As applied to visual impact analyses, sensitivity refers to public attitudes about specific views, or interrelated views, and is of key importance to identifying critical public views, assessing how important a visual impact may be, and whether or not it represents a significant impact.

24.1.1 Critical Public Views

Critical public views are sensitive public views that would be most affected by Project actions (e.g., views with the greatest intensity of potential impact due to viewer proximity to the Project, Project visibility, and duration of the affected view). Identifying critical public views relies on the concept that sensitivity is a function of the viewer's expectations, activities, awareness, values, and goals. Public sensitivity is not always related to obvious aesthetic appeal. The public may confer visual significance on landscape components and areas that would otherwise appear unexceptional (Federal Highway Administration [FHWA] 1981); therefore, the visual resource setting is not described in terms of aesthetic appeal. Instead, the importance of the affected landscape is inferred from the indicators of sensitivity. The degree of visual sensitivity is treated as occurring at one of four levels as follows:

- *High Sensitivity.* High sensitivity indicates a great potential for the public to react strongly to any lessening of visual quality. Concern is expected to be great

because the affected views are rare, unique, or are special to the region or locale in other ways. Also, high visual sensitivity is assumed to exist where landscapes, particular views, or the visual characteristics of certain features are protected through policies, goals, objectives, and design controls in public planning documents.

- *Moderate Sensitivity*. Moderate sensitivity indicates a substantial potential for the public to voice some concern over visual impacts of moderate to high intensity. Often, the affected views are secondary in importance or are similar to others commonly available to the public. Noticeably adverse changes would probably be tolerated if the essential character of the views remains dominant.
- *Low Sensitivity*. Low sensitivity indicates that a small minority of the public may have a concern over scenic/visual resource impacts on the affected area. Only the greatest intensity of adverse change in the condition of aesthetics/visual resources would have the potential to register with the public as a substantial reduction in visual quality.
- *No Sensitivity.* No sensitivity indicates that the views are not available to the public, there are no identifiable indications of public interest in the quality of scenic/visual resources within potentially affected public views, or there's no concern over adverse impacts to those scenic/visual resources.

The range of sensitive views was considered and several representative views in which the Project features would be most noticeable were selected for detailed analysis. The selection was based primarily on proximity to Project features and the degree and duration of exposure within sensitive public views. Consideration was also given to having the views be representative of the public experience (i.e., that they be from viewing positions frequently used by the public and readily located).

Within the Project area, public access is extremely limited and there are few public viewing positions from which any of the features of the Project may be seen. Land along the river reach is predominantly in private ownership and used for agricultural production. Public access is limited to the San Mateo Avenue crossing from the north along Road 13, which is a Madera County-maintained road up to, but not crossing the river. Access to the crossing from the south along San Mateo Avenue is unauthorized, as the road passes through private land. Public access to the Project area elsewhere is limited to Mendota Pool via a public park, a short stretch of the San Joaquin River below Mendota Dam, and at a few areas along the west shore of Mendota Pool immediately upstream of the dam. Public access to Mendota Dam itself is restricted. Additionally, there are four homes at the north end of Bass Avenue, and the residents would have visual access to features of two of the Project alternatives from the road approaching or leaving these homes.

Concerning existing public access to the San Joaquin River, see Section 20.1.3. Also see Section 16.1.1 for a description of the public trust easement under the California State Lands Commission (CSLC). To access the easement, legal access is required – the public is not entitled to cross private lands to use a public trust easement.

San Mateo Avenue Crossing

The San Mateo Avenue crossing is a dip crossing consisting of a culvert to convey low flows and an earthen embankment supporting the roadbed. During higher flows the road is overtopped and may be impassable to vehicles. Prior to Interim Flows, the river bed here was dry for most of the year and informally used for off-highway vehicle use. When flows are present, the public access the river at this location to swim (field observation) and to launch non-motorized watercraft for fishing and other purposes (see Chapter 20.0, "Recreation"). Recreation uses imply variable sensitivity to the potential for adverse impacts on the quality of the visual resources.

It is unknown how many people access the river from the south along San Mateo Avenue compared to the north along Road 13. As noted, San Mateo Avenue is not a public road 2.5 miles north of Highway 180 and access to the river using this road is unauthorized. It is assumed that people using the southern approach are predominately coming from Mendota (7.3 miles from the center of town to the crossing), while those using the northern route are coming from Firebaugh (11.6 miles away from the river crossing starting at Highway 33).

The volume of recreation use here is not known, but there are indications that the number of recreationists using the river crossing is small compared to the number enjoying the river near Mendota (discussed below) and Firebaugh. For example, there are a number of recreation opportunities along the river in Firebaugh that are close at hand, and access to fishing opportunities below Mendota Dam and in Mendota Pool are closer to Firebaugh than those at or near the river crossing. These recreation opportunities in Firebaugh or nearby, coupled with a circuitous and lengthy route to the river crossing, suggests that the crossing receives little public use compared to the sites at and near Firebaugh and Mendota. Additionally, public parking at or near the river crossing is limited, and there appear to be no turnouts in the public right-of-way along Road 13 (the closest public road), limiting the number of recreationists. Also, parking along the private dirt road on the Madera County side of the river is not authorized.

Sensitivity: Low. Anecdotal evidence for fishing, watercraft put-in, and off-highway vehicle opportunities suggest that there is some recreation at the river crossing; therefore, there may be some public sensitivity to potential visual impacts to the views of and from the river crossing. Undesignated but popularly used or appreciated recreation sites are treated as having moderate sensitivity; however, this site is of comparatively low popularity as compared to other river recreation sites in the vicinity (California Department of Fish and Wildlife [DFW] 2013). As a result, sensitivity for the potentially affected views at the river crossing is expected to be low.

Project Exposure: High. Under all Project alternatives, the San Mateo Avenue crossing would be modified. It would either be removed or improved to maintain vehicular access and accommodate increased flow magnitudes, durations, and frequencies associated with Restoration Flows. The improved crossing would entail a low flow or dip crossing with five 24-foot-span by 9-foot-rise concrete box culverts. Additionally, armoring would be installed along the entrance and exit of the structure and along the channel banks near the structure. These proposed structures would be in the foreground of views from the

vicinity of the river crossing. As a result, these views are considered to be critical public views.

Mendota Pool Park

Mendota Pool Park is about 0.75 mile from the northern city limits of Mendota, along Bass Avenue, and is the only public recreation facility in the Project area (see Chapter 20.0, "Recreation"). This 85-acre park is the largest of three in Mendota, providing active recreation facilities as well as areas for passive pursuits such as picnicking. Mendota Pool Park offers: a ball field; picnic tables; a playground; a stage; open space; access to Mendota Pool; and vehicular access at the park's southeast and northeast corners. From there, informal paths lead directly to and along over 1,000 feet of shoreline. A limited number of trash receptacles and picnic tables are provided close to the shore at the park's southeast and northeast corner, and pole-mounted directional lighting provides for evening use of some of the park's facilities.

While there are no boat launch facilities at the park, a paved boat launch is located off the gravel road leading to Mowry Bridge just north of Mendota Pool Park and the Delta-Mendota Canal (DMC). This facility primarily provides access to Fresno Slough and the part of Mendota Pool adjacent to the park. In addition to passive recreation occurring within the central part of the park, fishing from shore is a major park activity, as is boating and fishing out on the water.

Sensitivity: High. For this assessment, boating and fishing opportunities in this part of Mendota Pool are treated together with the public use of the park due to the proximity of these recreation uses (note that the Mendota Dam area is not accessible to boaters from Mendota Pool Park since Mowry Bridge serves as a barrier to downstream access). Because Mendota Pool Park is the only public recreation facility in the Project vicinity and views of and from developed recreation sites are treated as highly sensitive, sensitivity for the potentially affected views at Mendota Pool Park is expected to be high.

Project Exposure: Low to High. It is unlikely that Project features would be visible from public viewing positions within the park under two of the Project alternatives (Alternatives A and B); however, under the two Fresno Slough Dam alternatives (Alternatives C and D), a dam and new surface water canals constructed near Mowry Bridge would be visible from shore (970 to 1,238 feet away) or by boat. For example, exposure is expected to be low for users in the park because of the existing levees that obscure views of Fresno Slough, but moderate for users along informal paths near the existing levees(Fresno Slough Dam would be in the background of the view). Also, since boaters may be closer to the dam than users in the park or on informal paths near the levees, exposure may be expected to be high (with Fresno Slough Dam in the foreground of the view). Therefore, Project exposure is expected to be low to high depending on the viewer's distance to the potential Fresno Slough Dam. As a result, these views are considered to be critical public views.

Mendota Dam Area

The "Mendota Dam area" comprises part of Mendota Pool (above Mendota Dam and north of Mowry Bridge), Mendota Dam, and the area along the river immediately

downstream of Mendota Dam. There is a relatively high informal recreation use in this area (DFW 2013), including recreation on private property upstream and downstream of Mendota Dam along the shore. Activities along the shore include fishing, picnicking, and swimming. The use area includes more than 425 feet of the river's left bank, starting at a point immediately downstream of the dam. This area of the river is important to the residents of Mendota, given that it is their only proximate access to the river. Additionally, an unpaved watercraft put-in site is located here (see Figure 24-11), which serves DFW patrols, kayakers, and hunters wishing to access downstream portions of the river. This site is readily accessed via Bass Avenue, a public road, and there is substantial parking in an unpaved area adjacent to the road.

Because Mendota Dam and the areas upstream and downstream of the dam are privately-owned by Central California Irrigation District (CCID), fishing and boat launching activities are considered unauthorized uses in this area. There are signs and barriers restricting access at Mendota Dam, but there are none located upstream and downstream of the dam. The CCID, however, has no enforcement capabilities. Given the overtly restricted access, views from the dam are not addressed as public views.

Sensitivity: Moderate. The views from the areas downstream of the dam, along the river, and along Mendota Pool's west shore are addressed, as they are associated with obvious and documented recreation use that, though unauthorized, is unrestricted. Views of, and from, undesignated but popularly used areas of recreational significance to a local population are treated as moderately sensitive. Additionally, views from Bass Avenue, which is the primary access to these recreation sites, are also moderately sensitive where they occur from points within less than 0.5 mile from them. As a result, sensitivity for the potentially affected views at the Mendota Dam area is expected to be moderate.

Project Exposure: Low to High. Under the two Compact Bypass Alternatives (Alternatives A and B), no construction would occur near the Mendota Dam area. However, under the two Fresno Slough Dam alternatives (Alternatives C and D), a fish ladder would be constructed at Mendota Dam, flashboards would be removed, and the dam's sill would be notched. Associated construction activities (truck traffic, presence and movement of a work force, and heavy equipment) would be within the foreground of shore-based views in the Mendota Dam area and from Bass Avenue, just west of the dam. Additionally, the implementation of Alternatives C and D would lower the water surface elevation in the San Joaquin River arm of Mendota Pool, a change which would be within the immediate foreground of views from the west bank of this area, where some fishing occurs. Additionally, views from the fishing area and from Bass Avenue are moderately sensitive for the reasons stated above. Therefore, Project exposure is expected to be low to high depending on the viewer's distance to Project features.

Bass Avenue and Bass Avenue Residences

At the north end of Bass Avenue there is a group of four homes, which constitute a minor aggregation of rural residences.

Sensitivity: Low. Views from these residences, together with the views from the proximate stretch of Bass Avenue, their only access route, are of low sensitivity.

Project Exposure: Low. With the exception of the levee along Reach 3 adjacent the Bass Avenue residential area, which would be improved in two of the Project alternatives, views of Project features from the homes would not occur due to complete screening afforded by riparian vegetation along the west bank of the river. From Bass Avenue there would be limited views of the river and Mendota Dam and broad views of the area behind Mendota Dam. Changes to Mendota Dam and associated construction activity would be nearly ¼-mile distant for road-based views, as would changes to the Mendota Dam area due to the construction of Fresno Slough near Mowry Bridge. Therefore, Project exposure is expected to be low.

24.1.2 Existing Visual Conditions

The existing visual condition of the landscape is the point of reference for evaluating the intensity of potentially adverse changes to the landscape. This attribute is defined by the prevailing character of the setting and the degree to which past actions have adversely affected that character and its quality. It is assessed only for critical public views. Both the existing daytime visual conditions of the critical public view and the existing night lighting conditions are considered. Visual condition is addressed as the degree to which features of the setting and sources of lighting are *congruent* with the established, dominant character of the setting, and in terms of the *coherence* of the pattern in which these features and lighting sources are distributed. Visual condition is also addressed relative to "visual access": the extent to which historically available scenic views have become blocked or have become less accessible to the public.[1]

Visual character is defined in terms of the physical features that have become accepted over time as inherent to the area, those reflecting how the landscape was formed (e.g., ecological processes versus human activities), how it functions (e.g., serving land uses or ecological relationships), and how it is structured.

- Congruence (Intactness). Where past actions have noticeably and unfavorably changed landscape features, or introduced incompatible features, results appear incongruent with the inherent character of the area. In terms of the FHWA (1981) methodology, congruence is the landscape's state of "intactness," the integrity of the character type in terms of the degree to which "encroaching elements" may be present.
- Coherence (Unity). Where internal consistency and harmony of landscape features have been affected by past actions, results can lack coherence. A landscape may be "intact" relative to the type of features within view, yet past actions may have resulted in there being little to no discernible pattern, composition and/or harmony associated with those features. In terms of the FHWA (1981) methodology, this is the landscape's degree of "unity."
- Visual Access. Apart from its physical features, the affected landscape is also described in terms of the physical conditions under which it is viewed. These include the public's physical access to views, the breadth of available views (panoramic or narrowly focal), their duration and timing. Past actions may have

[1] The attribute of Visual Access is relevant to two of the six visual impact categories described in Section 24.3.1: Impact AES-1 and Impact AES-2.

limited physical access to formerly available viewing positions or partially or totally blocked visual resources from public view, shortened view duration, or altered when the views are available.

Regarding night lighting conditions, "light" refers to artificial light emissions, or the degree of brightness, generated by a given source, and "glare" occurs when light adversely affects a viewer. The existing condition of light and glare is defined by the following characteristics:

- Lighting Character. The character of lighting is defined in terms of the types of lighting present and their pattern of illumination. Illumination may be described in terms of: (1) *Ambient Lighting*, the general overall level of lighting in a given area; (2) *Corona*, which is the diffuse halo of light that exists above a lit area; and (3) *Glare*, as defined above. Glare is an adverse effect of past actions.
- Congruence (Intactness). As with daytime visual conditions, this attribute is the degree to which past actions have noticeably and unfavorably changed the type and/or intensity of lighting in an area such that the result appears incongruent with the inherent character of lighting there.
- Coherence (Unity). As it pertains to lighting, coherence is the internal consistency of scale, pattern and organization of the sources and effect of lighting relative to the potentially affected area.

The visual modification class (VMC) approach reflects the concepts and principles of the Visual Resource Management methodologies in use by the following Federal agencies: U.S. Department of Agriculture, Forest Service (USFS 1974, 1995); U.S. Department of Interior, Bureau of Land Management (BLM 1984); and U.S. Department of Transportation Federal Highway Administration (FHWA 1981). Existing visual conditions are evaluated as being within one of four VMCs, as summarized below. Note that the anticipated future condition of a landscape expected as a result of implementing a proposed project is also described in terms of VMCs.

- *VMC 1: Not Noticeable.* VMC 1 conditions occur when all features and sources of lighting appear congruent with the prevailing landscape character and are coherently arrayed. In VMC 1 landscapes, recognized and valued scenic views have not been, or would not be, noticeably blocked or screened by past or planned activities and physical access to recognized and valued viewing positions has not been, or would not be, noticeably affected by such activities.
- *VMC 2: Noticeable, Visually Subordinate.* VMC 2 conditions occur where landscape features and sources of light and glare have been noticeably affected by past actions, or would be so affected in the future. (The changes are expected to attract some attention but not compete for it with the established features in the field of view.) Or where recognized and valued scenic views have become, or would become, partially blocked by past or planned activities, and/or access to recognized and valued viewing positions has been, or would be, partially diminished.

- *VMC 3: Distracting, Visually Co-dominant.* VMC 3 conditions occur where changes in landscape features, their distribution, or sources of lighting have occurred, or may occur in the future, such that the changes compete, or would compete, for attention with the features and lighting inherent to that setting. Or where historically available and scenic views have become, or would become, substantially blocked by past or planned activities, and/or access to recognized and valued viewing positions has been, or would be, substantially diminished.
- *VMC 4: Visually Dominant.* VMC 4 conditions occur when incongruous changes in landscape features, sources of light and glare, and/or their distribution are, or would be, the focus of attention. Or where historically available and scenic views have become, or would become, totally, or nearly totally, blocked by past or planned activities, and/or recognized and valued viewing positions have become, or would become, inaccessible.

In the Project area, the existing visual conditions of importance are limited to the critical public viewing positions identified in Section 24.1.1. As noted, these are located at the San Mateo Avenue crossing, Mendota Pool Park, the Mendota Dam area and the Bass Avenue residential area (Figure 24-1). An overview of the character of the landscape is as follows.

Topographic Features. Reach 2B is a sandy, meandering river channel flanked by agricultural lands and ending to the west at Mendota Dam. The topography of the Project area and environs contributes little to its character, being flat and presenting no notable natural variations in landforms. The primary effect of the flat terrain is that views can be readily interrupted by even modest vertical features, mostly vegetation, constraining views to the foreground.

Vegetative Features. Vegetation features are described in Chapter 6.0, “Biological Resources – Vegetation.” From the Chowchilla Bifurcation Structure to the San Mateo Avenue crossing, there is little to no in-channel vegetation. Existing vegetation along the banks of the channel along this stretch consists mostly of riparian scrub and willow scrub communities. The San Joaquin arm of Mendota Pool (from the San Mateo Avenue crossing to Mendota Dam) supports perennial riparian vegetation, mostly willow riparian and cottonwood riparian forest communities with emergent wetland communities. These communities also occur along the banks near Mendota Dam and along the river below the Dam. The forest communities are the most pronounced, visually.

Figure 24-1.
Viewing Positions at the San Mateo Avenue Crossing (Top), Mendota Pool Park and Vicinity (Middle), and Mendota Dam Area (Bottom)

Water Features. The Mendota Pool, Mendota Dam, the San Joaquin River below the dam are the most memorable features within the critical public views identified. Mendota Dam and the reservoir it creates, located at the confluence of the San Joaquin River and Fresno Slough, have been features of the landscape for almost 100 years. The first water works in the area, the main canal conveying irrigation water to Los Banos Creek, was built in 1871. Mendota Dam was built in 1917 (San Joaquin River Restoration Program [SJRRP] 2011a). Today, Mendota Dam and Mendota Pool remain an important key to irrigation in the San Joaquin Valley. Associated features of Mendota Dam and Pool include the DMC, which conveys water from the Delta south to Mendota Pool, and several canals which divert water from the Pool for agricultural use.

Cultural Modifications. The primary features of the landscape—Mendota Dam, Mendota Pool, and the San Joaquin River below the Dam—appear today largely as they have since the original dam was constructed. However, since 1942 when Friant Dam was constructed, up to the beginning of Interim Flows, the San Joaquin River within Reach 2B was dry for most of the year. Interim Flows started in October 2009 and Restoration Flows started in January 2014. The existing visual conditions, including Mendota Dam, Mendota Pool, sloughs, canals, and the largely dry river bed, are modifications of the landscape dating as far back as 1871. These features, as well as supporting infrastructure such as roads and utilities, are inherent to a landscape managed for the purposes of agricultural irrigation. They reflect how it was formed, how it functions, and how it is structured. That is, they are not adverse changes to an otherwise natural-appearing landscape.

San Mateo Avenue Crossing

Access to the crossing is via San Mateo Avenue from the south, across private lands, and from the north via Road 13 and other public roads. Features of the crossing are visible from a limited stretch of Road 13 near the crossing and the crossing itself from public access routes. Views of and from the crossing do not extend far, being constrained by vegetation in the foreground, as shown in the photographs taken from Viewing Position (VP) 1 (Figure 24-2).

Prior to Interim Flows (fall 2009), Reach 2B was dry most of the year from the Chowchilla Bifurcation Structure to the San Mateo Crossing, flowing only in response to flood releases from Friant Dam. The crossing, however, marks the approximate limits of the backwater effects of Mendota Pool. From here to points downstream, the river channel is typically inundated. Note that the photograph in Figure 24-2 was taken in August 2010, during a period of Interim Flow.

Figure 24-2.
Views of the Riparian Vegetation within the San Joaquin River Channel Looking to the Northwest (Top) and to the East (Bottom), VP 1

Existing Visual Condition: VMC 1, Features Appear Congruent with the Prevailing Landscape Character and are Coherently Arrayed. The visual conditions, as of July 2009, are rated as having been VMC 1. As of this date, the area of the immediate crossing was entirely characteristic of a riparian setting along a river the flow regime of which was being managed for sustained deliveries of agricultural irrigation (largely dry river bed). No noticeable adverse changes to this character were in the potentially affected views (no incongruous features). The vegetative types occurred in a natural, random distribution and the river channel evinced a characteristically meandering course (coherently arrayed features). Visual access had been provided by a system of public roads; there was no indication that it had been impaired to any degree due to previous actions. No light sources were observed, nor were there any indications that any had ever been installed in the vicinity; the absence of night lighting is characteristic of the setting, as management of the river for agricultural irrigation requires none.

Mendota Pool Park

The critical public views are those that would include features of the Project or the indirect effects of those features. Within the park, such views occur along a levee that abuts the west shore of the nearby part of Mendota Pool. Figure 24-3 shows views from VPs 2 and 3, both located on or near the levee. For two of the Project alternatives (Alternatives C and D), a dam would be constructed near where Mowry Bridge is today, which is visible from the levee (at VP 2). That view is representative of those from points along approximately 560 feet of the levee between VP 2 and the northeast corner of Mendota Pool Park (VP 5). Just 100 feet to the southeast along Mendota Pool's edge is an area showing obvious signs of use for picnics and fishing (Figure 24-3, lower image, VP 3). Mowry Bridge is not visible from here, so the dam proposed under Alternatives C and D would also not be seen. The view from VP 3 is included to demonstrate the limit to the potential dam's visibility along Mendota Pool's edge.

The other views of Mendota Pool Park (shown in Figures 24-4 to 24-7) show the context for the critical public views, including lands to the southeast between the park and Mendota, recreation facilities within the park, and various structures and facilities along its northern edge unrelated to park activities. This context is integral to considerations of the inherent character of the landscape associated with the critical public views directed to the northeast across Mendota Pool. In Figure 24-4 there are two views from VP 4. In the upper image, the outskirts of Mendota are visible at a distance of more than a mile, as is a canal running along the south edge of the park, just visible beyond its bordering levee. The lower image is a view into the interior of the park, showing a covered picnic area and a restroom. Note that both images show that there is directional area lighting attached to the utility poles. It is therefore assumed that there is evening use of the park facilities.

Figure 24-5 is a panorama, the lower image continuing the left-to-right view started in the upper image; it discloses the proximity of Mendota Pool to the park facilities. Additionally, the lower image includes a pink building to the right, owned by the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and utilized by the San Luis Delta Mendota Water Authority. It serves for storage and occasional staging of equipment. The green building to the left is on CCID land leased to the city of Mendota.

It is assumed that it is used for equipment storage associated with maintenance of Mendota Pool Park. The radio tower in view and a 10' by 10' control room building just visible in line with it are next to the radial gates on the DMC. Together they serve to remotely operate the adjoining check structure. These structures also appear in Figures 24-6 and 24-7.

In Figure 24-6, the upper image (VP 6) shows a close view of the covered picnic facility and the restroom. More importantly it shows how the levee along Mendota Pool (seen in the distance beyond the picnic area) blocks sight of Mendota Pool, demonstrating why views from within the interior of the Park are not directly affected. As noted, though, they are important as context for views that would disclose Project features.

Figure 24-7 shows the views from VP 8 (top image) and VP 9 (bottom image), located along Bass Avenue from points within and at the edge of the park. The images indicate the proximity of structures associated with the operation of the DMC noted and how visible these are from the main access road serving the park.

Existing Visual Condition: VMC 1, Features Appear Congruent with the Prevailing Landscape Character and are Coherently Arrayed. The existing visual conditions, as of July 2009, are rated as having been VMC 1. The character of views from points within the park is defined by features of Mendota Pool, the park itself, and features associated with the operation of the nearby canals. No noticeable adverse changes to this character were in the potentially affected views (no incongruous features). As has been noted, Mendota Pool, sloughs, canals and their related structures (dam, sluice gates, flow controls) are features created by the management of the San Joaquin River for agricultural irrigation.

In the views shown from VPs 2 and 3 (Figure 24-3) during August 2010, Mendota Pool was at its normal water surface elevation. Mendota Pool is dewatered by the CCID to allow standard inspections and maintenance of Mendota Dam.[2] The CCID has dewatered Mendota Pool seven times in the last 12 years, typically starting in mid- or late November. Mendota Pool is typically refilled starting mid-January. Therefore, the views of Mendota Pool in Figure 24-3 represent its characteristic appearance from early winter to late fall. A dewatered pool during the interim is also characteristic of Mendota Pool.

Features interior to Mendota Pool Park are typical of developed public parks serving passive and active recreation (Figures 24-4 and 24-6, VPs 4 and 7). They include playground equipment, picnic tables, a ball field, stage and open areas of lawn, and storage sheds. However, structures associated with the management of the San Joaquin River for agricultural purposes—notably those controlling the flow of the nearby canals—were also in view (Figures 24-5, 24-6 and 24-7, VPs 5, 7 – 9).

[2] Although recent repairs at Mendota Dam have reduced the need to dewater Mendota Pool for dam inspections

Figure 24-3.
Views to Northeast across Mendota Pool of Mowery Bridge from VP 2 (Top) and from Picnic Site at VP 3 (Bottom)

Figure 24-4.
Views from VP4: Looking Southwest across Mendota Pool Park toward Mendota (Top); Looking Northwest into Center of Park (Bottom)

Figure 24-5.
Panoramic View Left (Top) to Right (Bottom), Looking Southwest to West from VP 5, at Northeast Corner of Mendota Pool Park

Figure 24-6.
View to Northeast from VP 6 Showing Picnic Area, Restroom, and Levee Blocking View of Mendota Pool (Top); View to Northwest from VP 7 of Ball Field, Night Lighting, and Various Utilities in Background (Bottom)

Figure 24-7.
Two Views Looking North from Bass Ave. (Top): VP 8, within Mendota Pool Park and (Bottom): VP 9 at North Edge of Park along DMC

In summary, types of features ordinarily not congruent with one another are, in the case of Mendota Pool Park, all inherent to how this landscape was formed, how it functions, and how it is structured. Because no noticeable adverse changes to the established character were within the potentially affected views and those related to them (interior park views) the landscape was "intact" (no incongruous features) as of July 2009. As well, the park is functionally organized and the shoreline vegetation around Mendota Pool is arrayed in an expected and natural distribution (coherent distribution of features). Visual access has been provided by Bass Avenue, a public road, and there are no indications that access has been impaired to any degree due to past actions.

Sources of directional night lighting were evident around the playing fields, roads and parking area, these being characteristic of a park serving active recreation. Their operation in the evening was not observed during field observations, so the quality of lighting was not recorded. However, the lighting, in function, is related to park use and appeared appropriately sited; it is therefore judged to be both congruent and coherently arrayed.

Mendota Dam Area

The Mendota Dam area includes the part of Mendota Pool north of Mowry Bridge, Mendota Dam, and the area along the river immediately downstream of the dam. Critical public views occur from Bass Avenue in the vicinity of these features, from along the west shore north of Mendota Dam, and from along part of the river's left bank, the latter starting at a point immediately below the dam at its west end and ending about 425 feet to the north in unincorporated Fresno County. Sensitivity for these views is treated as moderate, as noted in Section 24.1.1.

Mendota Pool is in the foreground of shore-based views and partially in view from a ¼-mile of Bass Avenue, starting from a point about 300 feet north of the Helm Canal crossing and extending 450 feet to a point opposite the west end of Mendota Dam. Figure 24-8 shows the panorama from the east end of Mendota Dam, looking southeast across part of Mendota Pool, to a stretch of Bass Avenue and a part of the shoreline north of the dam. A part of Mendota Pool is readily seen from the road and shoreline. From the west shore of Mendota Pool near Mendota Dam, views extend unimpeded across the water from the northeast to the south. However, given that Bass Avenue is close in elevation to Mendota Pool and separated from it by 150 to 250 feet of land, the low oblique views do not disclose as much of the Pool's surface as do views from the shore.

Mendota Pool is not visible from Bass Avenue north of Mendota Dam's west end. From this point, though, Mendota Dam and the San Joaquin River come into view from the road for about 1,000 feet. These are mobile views lasting cumulatively for about 22 seconds at a driving speed of 45 miles per hour. Note that for recreationists these views are repetitive, occurring numerous times during the year; for the residents at the end of Bass Avenue, the views occur daily. Those from the west bank of Mendota Pool and the west bank of the river below Mendota Dam, however, are stationary, affording a maximum degree of attention to detail.

Figures 24-9 and 24-10 present views from three points along Bass Avenue. The panorama in Figure 24-9 is directed northwest to northeast along the road from VP 11, close to Mendota Dam's west end. Agricultural lands typical of the Project area flank the road along its west-northwest side, while the San Joaquin River lines the road on its east-northeast side. This view occurs for those travelling north on Bass Avenue. Figure 24-10 shows the views from VP 12 (top) and VP 13 (bottom), both of which include the river and the part of Mendota Dam which would be modified under the two Fresno Slough Dam alternatives (Alternative C and D). These views represent those along about 220 feet of the road for residents driving south from the group of four homes at the road's north end.

Figure 24-11 presents the views from VPs 14 and 15, located along the west shore of the river below the Mendota Dam in an area on private property that experiences some recreation use including fishing, picnicking, swimming, boating, and, downstream from here, hunting. The upper image shows a close view of the potentially modified part of Mendota Dam (VP 14). The lower image is the downstream view from VP 15 (the location for potential fish passage facilities); Mendota Dam is a few feet from this point and readily in view, as well.

Existing Visual Condition: VMC 1, Features Appear Congruent with the Prevailing Landscape Character and are Coherently Arrayed. The existing visual conditions, as of July 2009, are rated as having been VMC 1. As of that date, Mendota Pool and the San Joaquin River below Mendota Dam would have been similar in appearance to views from August 2011 (Figures 24-8 to 24-11).

The Project area in view from Bass Avenue is at the interface between two character types—an agricultural landscape to the west, and abutting it to the east a river system engineered for agricultural irrigation resulting in an artificial body of water (Mendota Pool), Mendota Dam, canals, and supporting infrastructure. Because of the dependence of agricultural production on the delivery of irrigation water, the function, structure and patterns of development of one are interrelated with those of the other, and the two character types are therefore compatible.

The character of the potentially affected views is defined primarily by Mendota Dam, and the water surfaces of Mendota Pool and the San Joaquin River. Tall riparian vegetation along the river defines the skyline and clearly marks the river's course, even at a distance, as shown in the upper image in Figure 24-9. Also important visually are the canals and levees in the foreground of views from Bass Avenue, laid out in angular counterpoint to the sinuous river course nearby (Figure 24-9). The character of the potentially affected lands and that of the nearby agricultural area have remained intact for many decades; no adverse changes to the features of the landscape due to past actions were apparent during field investigations (no changes incongruous with the established setting). The features within the agricultural lands and their distribution—fields, barns, silos, farm houses, windbreaks—exactly express their function and structure and pattern of development.

Figure 24-8.
Panoramic View Looking Southeast, Left (Top) Continuing to Right (Bottom), across Mendota Pool from Mendota Dam, VP 10

Figure 24-9.
Panoramic View Looking Northwest to Northeast, Left (Top) Continuing to Right (Bottom), along Bass Ave. from VP 11

Figure 24-10.
Views of the San Joaquin River Looking South from Bass Ave., VP 12 (Top) and VP 13 (Bottom)

Figure 24-11.
Views across San Joaquin River from Area below Mendota Dam: Facing Southeast toward Dam, VP 14 (Top); Facing Northeast Downstream, VP 15 (Bottom)

Bass Avenue Residential Area

The Bass Avenue residential area comprises four homes at the north end of Bass Avenue. Views from these residences include screening vegetation lining the southeast side of Bass Avenue, opposite these homes (Figure 24-12). There is a limited view of the river from the north end of Bass Avenue at a point less than 200 feet from the homes. At flood stage, the San Joaquin River would be readily seen from here. As of the July 2009, though, the river would have been at a much lower level, similar to what is shown in Figure 24-13, lower image, and not appreciably visible.

Views from Bass Avenue are important to the residents of the four homes since this road provides their only access route. They have repetitive—if short-duration—views that include Mendota Dam, the river, and Mendota Pool. The road-based views have low sensitivity, due to the limited number of homes in the area—and the low exposure to the features of the river. Changes to the dam and associated construction activity would be in the background, as would changes to Mendota Pool area behind the dam due to the potential construction of a dam near Mowry Bridge.

Existing Visual Condition: VMC 1, Features Appear Congruent with the Prevailing Landscape Character and are Coherently Arrayed. The existing visual conditions of views from Bass Avenue, as of July 2009, are rated as having been VMC 1. Refer to the assessment of the Mendota Dam area views for the details of the assessment of these visual conditions.

Figure 24-12.
Panoramic View of Bass Ave. Residences from VP 13, Looking Southwest to West, Left (Top) Continuing to Right (Bottom)

Figure 24-13.
Views from and near Gate at North End of Bass Ave., Looking North (Top) and Northeast (Bottom)

24.2 Regulatory Setting

The regulatory setting, as it pertains to visual resources, is comprised of public policies, objectives, and supporting laws, ordinances, regulations, or standards which serve to protect and preserve the quality of visual resources and/or physical access to views of those resources. Of importance is whether potential impacts would be inconsistent with the regulatory setting.

24.2.1 Federal

The National Scenic Byways Program was established under the Intermodal Surface Transportation Efficiency Act of 1991 and reauthorized in 1998 under the Transportation Equity Act for the 21st Century. Under the program, the U.S. Secretary of Transportation recognizes certain roads as National Scenic Byways or All-American Roads based on their archaeological, cultural, historic, natural, recreational, and scenic qualities. However, the National Scenic Byways Program highlights no roads within or near the Project area.

24.2.2 State of California

California's Scenic Highway Program was created by the California Legislature in 1963. Its purpose is to protect and enhance the natural scenic beauty of California highways and adjacent corridors through special conservation treatment. No officially designated State scenic highways are located in the Project area.

24.2.3 Regional and Local

This section discusses regional and local plans and policies relating to visual resources.

Madera County General Plan

Policies relating to scenic/visual resources are found in the Madera County General Plan (1995). Three policies are potentially applicable to the Project or its alternatives as follows:

- *Section 1, Land Use, Subsection H. Visual and Scenic Resources, Policy 1.H.1:* The County shall require new development in scenic rural areas to avoid locating structures along ridgelines, on steep slopes, or in other highly visible locations except if the location is required to avoid hazards or design and screening measures are incorporated to minimize the visibility of the structures and graded areas.
- *Section 5, Agricultural and Natural Resources, Sub-section C. Water Resources, Policy 5.C.6:* This policy requires that natural watercourses be integrated into new development such that they are accessible to the public and provide a positive visual element.
- *Section 6, Health and Safety, Subsection B. Flood Hazards, Policy 6.8.5:* Policy 6.8.5 requires flood control structures, facilities and improvements to be designed to preserve scenic values.

Fresno County Master Plan

Policies relating to scenic/visual resources are found in the Fresno County General Plan (Fresno County 2000). Of these visual/scenic resource-related policies, one is potentially applicable to the Project or its alternatives as follows:

- *Open Space and Conservation Element, Water Resources, Policy OS-A.18:* This policy is the same as the Madera County General Plan Water Resources Policy 5.C.6, which requires that natural watercourses be integrated into new development such that they are accessible to the public and provide a positive visual element.

Other policies of the Madera and Fresno County General Plans reference scenic/visual resource protection but are not included in the Regulatory Setting because the policies:

- Apply to land uses, such as rangelands, industrial, commercial and residential development, either not occurring within the Project area or not occurring within critical public views that include the Project area.
- Apply to plans not pertaining to the immediate Project area.
- Apply to resources, conditions, geographical features, or facilities not found within the Project area or, if within the area, are not within critical public views of the Project or its alternatives. These would include, for instance, forest and mineral resources; oak woodlands; hillsides and ridges; designated scenic drives, roads, highways or their corridors; and designated scenic views, panoramas and vistas.
- Are general statements of the County's intentions to preserve/protect visual/scenic resources and what the County *should* do, methods to be applied, studies to be conducted, resource maps to be developed, and priorities established. These include statements such as: "The County should require development adjacent to scenic areas…to incorporate natural features of the site…to minimize impacts to the scenic qualities of the site (Fresno County General Plan Open Space and Conservation Element, Subsection K. Scenic Resources: Policy OS-K.4).

San Joaquin River Parkway Master Plan

The Program Environmental Impact Statement/Report (PEIS/R) references the San Joaquin River Parkway Master Plan as a relevant part of the regulatory setting (SJRRP 2011b, page 25-6). This is a conceptual, long-range planning document intended to help preserve, enhance, and provide for enjoyment of the natural landscape of the San Joaquin River corridor. As proposed in 1992, the parkway would include the San Joaquin River and approximately 5,900 acres of land on both sides of the river between Friant Dam and the State Route (SR) 99 crossing, as well as the existing 17-acre Skaggs Bridge Park at the SR 145 crossing. This park, however, is more than 13 miles east of the Chowchilla Bifurcation Structure, the easternmost part of the Project area. The Plan, therefore, does not apply to the Project or its alternatives.

24.3 Environmental Consequences and Mitigation Measures

24.3.1 Impact Assessment Methodology

The aesthetic and visual resources assessment compares public views of the existing condition of aesthetics resources to the conditions anticipated from implementing any of the Project alternatives. A review of literature and maps, an inspection of the Project site and the potentially affected environs served to identify these public views. The analysis uses information contained in the PEIS/R and site visit information to determine whether construction and operation of the Project alternatives would directly impact aesthetics and visual resources.

The visual resources assessment focused on identifying visual impacts, their intensity, and whether they would be significant. The VMC approach conforms to the documentation requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) and closely follows the concepts and principles of Federal visual analysis methodologies. Steps in the VMC approach to visual impact assessment are summarized as follows:

- Identify critical public views potentially affected by the Project (e.g., legally protected views, designated areas of interest, sites of cultural/religious importance, scenic highways, and residential areas).
- Identify any Federal, State, county, and local laws, ordinances, regulations, and standards, as well as planning policies and objectives, that expressly protect or recognize the value of specific public views or view corridors.
- Describe the existing visual conditions of those potentially affected critical public views.
- Estimate the intensity of possible adverse visual impacts on those views.
- Evaluate the significance of the possible impacts (the relationship of impact intensity to public sensitivity).
- As applicable, consider possible mitigation measures that could lessen the impacts to a level of intensity that is less than significant.

24.3.2 Significance Criteria

The Project is evaluated in accordance with the aesthetics section of Appendix G of the State CEQA Guidelines. Under NEPA Council on Environmental Quality regulations, effects must be evaluated in terms of their context and intensity. These factors were considered when applying State CEQA guidelines Appendix G. Implementation of the Project could result in potentially significant impacts to visual quality and aesthetics if the Project would result in any of the following:

- Have a substantial adverse effect on a scenic vista.
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway.

- Substantially degrade the existing visual character or quality of the site and its surroundings.
- Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

A perceptible reduction in visual quality generally must persist for a year or more before being treated as a significant impact. Also, an adverse visual impact may be significant if it is inconsistent with laws, ordinances, regulations, and standards, whether or not it meets other significance criteria; the impact, however, generally must be estimated to last more than 1 year.

24.3.3 Impacts and Mitigation Measures

This section provides an evaluation of direct and indirect effects of the Project Alternatives on visual resources. It includes analysis of potential effects relative to the No-Action Alternative in accordance with NEPA and potential impacts compared to existing conditions to meet CEQA requirements. The analysis is organized by Project alternative with specific impact topics numbered sequentially under each alternative. With respect to visual resources, the environmental impact issues and concerns are:

1. Construction Related Effects on the Visual Quality of the Project Site and Its Surroundings.
2. Long-term Changes in the Visual Character or Quality of the San Mateo Avenue Crossing.
3. Long-term Changes in the Visual Character or Quality of the Mendota Pool Park Area.
4. Long-term Changes in the Visual Character or Quality of the Mendota Dam Area.
5. Long-term Changes in the Visual Character or Quality of the Bass Avenue Residential Area.
6. Substantial Changes in Light or Glare.

Other visual resources related issues covered in the PEIS/R are not covered here because they are programmatic in nature and/or are not relevant to the Project area.

Issues Eliminated from Further Analysis

There are no scenic highways or designated scenic vistas in the Project area, therefore views from scenic highways and scenic vistas would not be affected by the Project alternatives and will not be discussed further.

No-Action Alternative

Under the No-Action Alternative the Project would not be implemented and none of the Project features would be developed in Reach 2B of the San Joaquin River. However, other proposed actions under the SJRRP would be implemented including habitat restoration, augmentation of river flows, and reintroduction of salmon. Without the Project in Reach 2B, however, these activities would not achieve the Settlement goals.

The potential effects of the No-Action Alternative are described below. The analysis is a comparison to existing conditions, and no mitigation is required for No-Action.

Impact VIS-1 (No-Action Alternative): ***Construction Related Effects on the Visual Quality of the Project Site and Its Surroundings.*** Under the No-Action Alternative, no construction related activities would take place in the Project area, as the Project would not be implemented. As a result there would be **no impact** on existing visual resources resulting from construction of the Project.

Impact VIS-2 (No-Action Alternative): ***Long-term Changes in the Visual Character or Quality of the San Mateo Avenue Crossing.*** Under the No-Action Alternative, none of the proposed facilities that are part of the Project would be developed. However, Program-level improvements would still occur that could lead to improvements in riverine habitat, and as such an improvement in existing visual conditions as compared to existing conditions. Increased flows in the San Joaquin River would improve the health of the aquatic ecosystem that would potentially improve visual conditions in the San Mateo Avenue area by increasing riparian habitat. Therefore, the No-Action Alternative would create a **beneficial** effect on the existing visual character.

Impact VIS-3 (No-Action Alternative): ***Long-term Changes in the Visual Character or Quality of the Mendota Pool Park Area.*** Under the No-Action Alternative, the timing and/or duration of Restoration Flows would increase through Mendota Pool; however the visual characteristics of the Pool including water surface elevation and habitat would likely remain the same as compared to existing conditions. Furthermore, there would be little, if any, changes to visual resources in the Fresno Slough arm of Mendota Pool. Therefore there would be **no impact** to the visual character of the Mendota Pool Park area.

Impact VIS-4 (No-Action Alternative): ***Long-term Changes in the Visual Character or Quality of the Mendota Dam Area.*** Refer to VIS-3 (No-Action Alternative); the same impacts would occur here. There would be more flow over the dam, but effects to visual resources would be consistent with existing conditions. Therefore there would be **no impact** to the visual character of the Mendota Dam area.

Impact VIS-5 (No-Action Alternative): ***Long-term Changes in the Visual Character or Quality of the Bass Avenue Residential Area.*** Refer to VIS-3 (No-Action Alternative); the same impacts would occur here. There would be more flow below the dam, but effects to visual resources would be consistent with existing conditions. Therefore there would be **no impact** to the visual character of the Bass Avenue residential area.

Impact VIS-6 (Alternative): ***Substantial Changes in Light or Glare.*** The No-Action Alternative would not create a new source of substantial light or glare that would affect daytime or nighttime views in the Project area. As a result there would be **no impact** on existing visual resources resulting from changes in light or glare.

Alternative A (Compact Bypass with Narrow Floodplain and South Canal)
Alternative A would include construction of Project facilities including a Compact Bypass channel, a levee system encompassing the river channel with a narrow floodplain, and the South Canal. Other key features include construction of the Mendota Pool dike (separating the San Joaquin River and Mendota Pool), a fish barrier below Mendota Dam, and the South Canal bifurcation structure with fish passage facility and fish screen, modification of the San Mateo crossing, and the removal of the San Joaquin River control structure at the Chowchilla Bifurcation Structure. Construction activity is expected to occur intermittently over an approximate 132-month timeframe.

Impact VIS-1 (Alternative A): ***Construction Related Effects on the Visual Quality of the Project Site and Its Surroundings.*** Compared to the No-Action Alternative, implementation of Alternative A has the potential to result in short-term impacts on visual resources from construction activities from nearby public view points.

As previously discussed in Section 24.1.1, visual access to the Project area is limited. The majority of the Project area is bordered by private lands and roads. The existing visual conditions of importance are limited to the critical public viewing positions identified in Section 24.1.1. As noted, these are located at the San Mateo Avenue crossing, Mendota Pool Park, the Mendota Dam area, and Bass Avenue (Figure 24-1). Public views of the San Joaquin River portion of the Project area upstream of Mendota Pool are only available from the San Mateo Avenue crossing.

Downstream of Mendota Dam, the river is seen from public viewing positions along the river and near Mendota Dam. These include the below-Dam informal recreation site and points along Bass Avenue. Part of Mendota Pool can be seen from Mendota Pool Park, although it is more visible from public viewpoints along Bass Avenue and in the vicinity of Mendota Dam. Sensitive receptors are recreationist users of Mendota Pool, Mendota Pool Park, as well as motorists traveling along Bass Avenue.

Construction activities under Alternative A could take place at any time during the year and could reduce the aesthetic qualities of views in the Project area by introducing earth moving equipment and other construction equipment, materials and work crews into the viewshed. General construction activities may include excavation, earth movement, construction of a new road crossing, construction of new levees, water diversion for building of in-stream facilities, construction of new canals, and construction of control structures, fish passage facilities, and fish screens. Further, the presence and movement of heavy construction equipment and potential construction-related generation of dust could temporarily degrade the existing visual character of the area. Recreationists' views of construction would largely be blocked by intervening vegetation and topography. Agricultural workers would have longer views of construction areas than recreationists because they are present longer, but this group is not considered a sensitive viewer group. Motorists would have limited and short duration views of the area while traveling along Bass Avenue. Construction activities would impact the visual character from sensitive viewpoints, as construction schedule dictates, on a periodic and limited basis over the 132-month construction period.

When comparing Alternative A to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). Due to construction activities, the visual quality and character of the Project area vistas would diminish. Based on the sensitivity of viewpoints, high exposure to the Project, and the multi-year time frame of construction, impacts on visual resources would be **potentially significant**.

Mitigation Measure VIS-1 (Alternative A): ***Minimize Visual Disruption from Construction Activities.*** The construction contractor will be required to adhere to the following construction requirements regarding construction-related visual/aesthetic disruption. The impact would be **less than significant** after mitigation.

Implementation Action: Minimize construction related impacts on visual resources by including requirements in the contract with the construction company. In order to minimize visual disruption, the construction contractor will be required to implement the following:

- When possible, preserve existing vegetation, particularly vegetation along the edge of construction areas that may help screen views.
- After construction, regrade areas located outside of the floodplain that were disturbed by construction, staging, and storage to original contours where feasible, and revegetate with plant material similar in replacement numbers and types to that which was removed based upon local jurisdictional requirements. If there are no local jurisdictional requirements, replace removed vegetation at a 1:1 replacement ratio for shrubs and small trees, and 2:1 replacement ratio for mature trees.
- To the extent feasible, do not locate construction staging sites within the immediate foreground distance (0 to 500 feet) of existing residential, recreational, or other high-sensitivity receptors. Where such siting is unavoidable, staging sites will be screened from sensitive receptors using appropriate solid screening materials such as temporary fencing and walls.

Location: The location of proposed construction area modifications will vary as construction activities move throughout the Project area but will be focused primarily at Mendota Pool Park and San Mateo Avenue. Fencing will be implemented where topography and Project area activities allow.

Effectiveness Criteria: Effectiveness will be based on public complaints to the SJRRP.

Responsible Agency: Reclamation, CSLC, and the contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Mitigation will be ongoing over the construction timeframe.

Impact VIS-2 (Alternative A): *Long-term Changes in the Visual Character or Quality of the San Mateo Avenue Crossing.* Compared with the No-Action Alternative, Alternative A proposes new facilities that would impact the existing visual character and quality of the Project area at critical public viewpoints including the San Mateo Avenue crossing. Potential visual impacts for the public viewpoint at the San Mateo Avenue crossing are described below based on their sensitivity, Project exposure and visual modification class.

- *Sensitivity: Low.*
- *Project Exposure: High.*
- *Existing Visual Condition: VMC 1, Features Appear Congruent with the Prevailing Landscape Character and are Coherently Arrayed.*

In contrast to the No-Action Alternative, improvements to the San Mateo River crossing under Alternative A include installing a low flow or dip crossing with multiple, counter-sunk concrete box culverts designed for highway loading. Armoring is included along the entrance and exit of the structure as well as along the channel banks in the immediate vicinity of the structure. Culverts would be embedded below the existing channel bed. Grouted riprap would be placed in the culvert below the existing channel bed to prevent channel scour reaching the floor of the culvert and to create a roughened boundary layer for fish passage. Native bed material would be placed above the grouted riprap up to the existing channel bed elevation to provide passage conditions similar to that which exists in the adjacent natural stream (see Section 2.2.5). These improvements would be congruent with the existing character and quality of the San Mateo crossing. At certain flows the crossing would be overtopped, and it would mirror existing conditions. Improvements in the crossing, the placement of native bed material above grouted riprap, and the improvements to the channel bed and riparian vegetation would have a beneficial effect on visual resources at the San Mateo Avenue crossing.

When comparing Alternative A to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). Based on the existing conditions and the proposed improvements the effects on visual resources are considered **beneficial**.

Impact VIS-3 (Alternative A): *Long-term Changes in the Visual Character or Quality of the Mendota Pool Park Area.* Potential visual impacts for the public viewpoint at Mendota Pool Park are described below based on sensitivity, Project exposure and visual modification class.

- *Sensitivity: High.*
- *Project Exposure: Low.*
- *Existing Visual Condition: VMC 1, Features Appear Congruent with the Prevailing Landscape Character and are Coherently Arrayed.*

Under Alternative A, no construction would occur near Mendota Pool Park. As noted in Section 24.1.1, the park users would regularly experience views of existing levees and

water infrastructure, and expect views of agricultural and rural character. Compared to the No-Action Alternative, these views in the Fresno Slough arm of Mendota Pool would be unchanged.

When comparing Alternative A to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). There would be **no impact** on visual resources at Mendota Pool Park.

Impact VIS-4 (Alternative A): ***Long-term Changes in the Visual Character or Quality of the Mendota Dam Area.*** Potential visual impacts for the public viewpoints in the Mendota Dam area are described below based on sensitivity, Project exposure and visual modification class.

- *Sensitivity: Moderate.*
- *Project Exposure: Low.*
- *Existing Visual Condition: VMC1, Features Appear Congruent with the Prevailing Landscape Character and are Coherently Arrayed.*

Under Alternative A, no construction would occur at or near the Mendota Dam area. The character of the potentially affected views in the Mendota dam area is defined primarily by Mendota Dam, the water surfaces of Mendota Pool and the San Joaquin River. Critical public views of Mendota Dam or from Mendota Dam are not changed by Alternative A; therefore the visual character of the Mendota Pool area would remain congruent in terms of mass, color, line and form. Compared to the No-Action Alternative, critical public views in the Mendota Dam area would be unchanged.

When comparing Alternative A to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). There would be **no impact** on visual resources in the Mendota Dam area.

Impact VIS-5 (Alternative A): ***Long-term Changes in the Visual Character or Quality of the Bass Avenue Residential Area.*** Potential visual impacts for the public viewpoint at the Bass Avenue residential area are described below based on sensitivity, Project exposure and visual modification class.

- *Sensitivity: Low.*
- *Project Exposure: Low.*
- *Existing Visual Condition: VMC1, Features Appear Congruent with the Prevailing Landscape Character and are Coherently Arrayed.*

In contrast to the No-Action Alternative, the levee along Reach 3 adjacent the Bass Avenue residential area would be improved. The character of the potentially affected views in the Bass Avenue residential area is defined primarily by the existing levee and vegetation along the San Joaquin River. Existing vegetation may be removed to make the

levee improvements and large woody vegetation, such as trees and shrubs, on the levee itself would not be replaced after the improvements due to implementation of more rigorous maintenance standards for new levees. However, trees and shrubs within the San Joaquin River floodplain inside the levee is expected to remain and improve with increased flows; therefore the visual character of the Bass Avenue residential area would only slightly modify the color, line and form of the visual resources, as it would replace or enhance the existing levee and trees and shrubs located within the new levees are expected to improve under Alternative A.

When comparing Alternative A to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative A to No-Action). Based on the existing conditions and the proposed improvements, the impacts on visual resources are considered **less than significant** in the Bass Avenue residential area.

Impact VIS-6 (Alternative A): ***Substantial Changes in Light or Glare.*** Compared to the No-Action Alternative, construction activities may introduce new sources of nighttime light or glare under Alternative A. For example, equipment staging areas and construction areas may be temporarily lit at night during the construction period. Although views of the construction areas from nearby residences would be largely obscured by intervening distance, topography, and/or vegetation, construction activities could cause a noticeable change light or glare at some locations. Nighttime lighting related to construction would be temporary or short term.

When comparing Alternative A to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraph (i.e., the comparison of Alternative A to No-Action). Impacts on visual resources from changes in light and glare are considered **potentially significant**.

Mitigation Measure VIS-6 (Alternative A): ***Require Conformance to Lighting Standards.*** Project proponents will conform to the guidelines described below to reduce impacts associated with light and glare during the construction phase. The impact after mitigation would be **less than significant**.

> **Implementation Action:** Minimize construction related impacts on visual resources by including requirements in the contract with the construction contractor.
>
> - If construction lighting is needed, contractors will be required to shield lighting and direct lights downward onto the work site.
> - Meet the minimum county lighting standards for all Project-related lighting. All lighting fixtures will be designed to be consistent with the guidelines contained in the applicable county general plan.
> - Shield or screen lighting fixtures to direct the light downward and prevent light from spilling on adjacent properties.

- Prohibit the use of harsh mercury vapor, low-pressure sodium, or fluorescent bulbs.
- Consider design features, namely directional shielding for all substantial light sources, that will reduce effects of nighttime lighting. In addition, consider the use of automatic shutoffs or motion sensors for lighting features to further reduce excess nighttime light. All nighttime lighting will be shielded to prevent the light from shining off the surface intended to be illuminated.

Location: The location of proposed construction area modifications will vary as construction activities move throughout the Project area but will be focused primarily at the Mendota Dam area and the Bass Avenue residential area.

Effectiveness Criteria: Effectiveness will be based on public complaints to the SJRRP.

Responsible Agency: Reclamation, CSLC, and the contractor.

Monitoring/Reporting Action: Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.

Timing: Mitigation will be ongoing over the construction timeframe.

Alternative B (Compact Bypass with Consensus-Based Floodplain and Bifurcation Structure), the Preferred Alternative

Alternative B would include construction of Project features including a Compact Bypass channel, a levee system with a wide, consensus-based floodplain encompassing the river channel, and the Compact Bypass Bifurcation Structure with fish passage facility and fish screen. Other key features include construction of a fish passage facility at the Chowchilla Bifurcation Structure, the re-route of Drive 10 ½ (across the Compact Bypass Control Structure), and removal of San Mateo crossing. Construction activity is expected to occur intermittently over an approximate 157-month timeframe.

Impact VIS-1 (Alternative B): ***Construction Related Effects on the Visual Quality of the Project Site and Its Surroundings.*** Compared to the No-Action Alternative, implementation of Alternative B has the potential to result in short and long-term impacts on visual resources near construction activities from public view points. Under Alternative B construction related effects on visual impacts would generally be the same as those described for Alternative A with one exception. Project construction would take place over a longer time frame, 157 months; therefore construction would impact visual resources in these areas for a longer duration. Construction activities would be similar in scope and impacts as the ones discussed in Impact VIS-1 (Alternative A).

When comparing Alternative B to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraph (i.e., the comparison of Alternative B to No-Action). Because these impacts would occur intermittently within the overall construction time frame for the entire project, they are considered **potentially significant.**

Mitigation Measure VIS-1 (Alternative B): ***Minimize Visual Disruption from Construction Activities.*** Refer to Mitigation Measure VIS-1 (Alternative A). The same mitigation measure would be used under Alternative B as under Alternative A. The impact after mitigation would be **less than significant**.

Impact VIS-2 (Alternative B): ***Long-term Changes in the Visual Character or Quality of the San Mateo Avenue Crossing.*** Compared with No-Action Alternative, Alternative B would remove the existing culvert at the San Mateo Avenue crossing, which would change the visual character and quality at the crossing by restoring a continuous river channel and improving the overall natural character. The wider floodplain would not substantially affect the quality and character of visual conditions at this public view point.

When comparing Alternative B to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraph (i.e., the comparison of Alternative B to No-Action). Based on the existing conditions and the proposed removal of the culvert, the effects on visual resources are considered **beneficial**.

Impact VIS-3 (Alternative B): ***Long-term Changes in the Visual Character or Quality of the Mendota Pool Park Area.*** Refer to Impact VIS-3 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. There would be **no impact** on visual resources at Mendota Pool Park.

Impact VIS-4 (Alternative B): ***Long-term Changes in the Visual Character or Quality of the Mendota Dam Area.*** Refer to Impact VIS-4 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. There would be **no impact** on visual resources in the Mendota Dam area.

Impact VIS-5 (Alternative B): ***Long-term Changes in the Visual Character or Quality of the Bass Avenue Residential Area.*** Refer to Impact VIS-5 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. Impacts on visual resources are considered **less than significant** in the Bass Avenue residential area.

Impact VIS-6 (Alternative B): ***Substantial Changes in Light or Glare.*** Refer to Impact VIS-6 (Alternative A). Potential impacts of Alternative B would be the same as potential impacts of Alternative A. Impacts on visual resources from changes in light and glare are considered **potentially significant**.

Mitigation Measure VIS-6 (Alternative B): ***Require Conformance to Lighting Standards.*** Refer to Mitigation Measure VIS-6 (Alternative A). The same mitigation measures would be used under Alternative B as under Alternative A. The impact after mitigation would be **less than significant**.

Alternative C (Fresno Slough Dam with Narrow Floodplain and Short Canal)

Alternative C would include construction of Project features including Fresno Slough Dam, a levee system with a narrow floodplain encompassing the river channel, and the Short Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the Short Canal control structure and fish screen,

the Chowchilla Bifurcation Structure fish passage facility, modification of San Mateo crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 133-month timeframe.

Impact VIS-1 (Alternative C): ***Construction Related Effects on the Visual Quality of the Project Site and Its Surroundings.*** Compared to the No-Action Alternative, implementation of Alternative C has the potential to result in short-term impacts on visual resources near construction activities from public view points. Construction related activities would generally be the same as those described for Alternative A, with several exceptions. Unlike Alternative A, construction activities in Alternative C would be more concentrated in the Mendota Pool and Fresno Slough areas, where new fish passage and dam facilities are proposed. As a result impacts to viewpoints like the informal paths on the levee tops, bordering Mendota Pool Park would be greater under Alternative C than Alternative A. The construction impacts related to building Fresno Slough Dam would adversely affect viewsheds of informal paths users at Mendota Pool Park. Construction equipment, workers and activities would be part of the background of views in Mendota Pool Park levee areas. Direct and indirect construction activities would impact viewsheds in the Project area under Alternative C on and off for 133 months.

When comparing Alternative C to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraph (i.e., the comparison of Alternative C to No-Action) and as discussed under Impact VIS-1 (Alternative A). The visual quality and character of Project area vistas would be impacted during the construction period. Based on viewshed sensitivity, exposure to the Project and the multi-year time frame of construction, impacts on visual resources are considered **potentially significant** under Alternative C.

Mitigation Measure VIS-1 (Alternative C): ***Minimize Visual Disruption from Construction Activities.*** Refer to Mitigation Measure VIS-1 (Alternative A). The same mitigation measures would be used under Alternative C as under Alternative A. The impact after mitigation would be **less than significant**.

Impact VIS-2 (Alternative C): ***Long-term Changes in the Visual Character or Quality of the San Mateo Avenue Crossing.*** Compared with No-Action Alternative, Alternative C impacts at the San Mateo Avenue crossing are similar in scope and scale with impacts of Alternative A. The Project would not substantially impact the quality and character of visual conditions at this public view point. As discussed in Impact VIS-2 (Alternative A), proposed facilities are congruent with existing line, form, mass and color of the visual resources in the Project area, and maintain the character of the Project area. The enhancement of color and mass of existing visual conditions improvements through channel bed and riparian vegetation improvements would have a beneficial effect on the visual resources in the Project area.

When comparing Alternative C to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraph (i.e., the comparison of Alternative C to No-Action). Based on the existing conditions and the proposed improvements, the effects on visual resources are considered **beneficial**.

Impact VIS-3 (Alternative C): ***Long-term Changes in the Visual Character or Quality of the Mendota Pool Park Area.*** Potential visual impacts for the public viewpoint at Mendota Pool Park are described below based on sensitivity, Project exposure and visual modification class.

- *Sensitivity: High.*
- *Project Exposure: Moderate to High.*
- *Existing Visual Condition: VMC 1, Features Appear Congruent with the Prevailing Landscape Character and are Coherently Arrayed.*

Under Alternative C, Fresno Slough Dam and new surface water canals would be constructed near Mowry Bridge. From the closest points along the west shore in the park, these Project features would be from 970 to 1,240 feet away, placing them in the background of the closest affected shore-based views. Boaters and recreational users of Mendota Pool waters could, at their choice, be closer. Users of the park recreational facilities views would not be impacted by the construction of a new dam or surface water canals, as the structures would not be visible form the various facilities (picnic tables, picnic areas).

The introduction of a new dam at Mowry Bridge and surface water canals would impact the color, mass, line and form of views from the levee top of Mendota Pool Park. The views from the informal paths would be impacted by the new cement dam structure. Under Alternative C, the new dam would be constructed in the vicinity of Mowry Bridge, thus blocking views of the bridge. Although viewers expect water infrastructure and agricultural uses as part of their views, Fresno Slough Dam and the surface water canals would be new structures that would degrade the quality of the visual resources for users of informal levee paths. The visual resources currently include Mowry Bridge, and the addition of a new dam and surface water canals would modify viewers' experiences.

Nonetheless, the dam and proposed infrastructure are in keeping with the overall character of the Project area. The area is composed of water infrastructure, irrigation facilities and other structures like Mendota Dam and Mowry Bridge. Over time Fresno Slough Dam and the surface water canals would become part of the character of the area, as it is defined by agricultural uses and water control infrastructure. The new structures would represent an interruption in the visual coherence of the site, but only for a limited number of viewers. The users of Mendota Pool Park recreational facilities would not experience views of the new dam or new canals. The new dam would impact views of informal path users by introducing a new cement structure in their view path. Nonetheless, the new structures would be congruent with the character of the site, and only slightly modify the color, line and form of the visual resources, as it would replace or enhance Mowry Bridge.

When comparing Alternative C to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative C to No-Action). Based on the existing conditions and the proposed

improvements, the impacts on visual resources are considered **less than significant** in the Mendota Pool Park area.

Impact VIS-4 (Alternative C): *Long-term Changes in the Visual Character or Quality of the Mendota Dam Area.* Potential visual impacts for the public viewpoint at Mendota Dam area are described below based on sensitivity, Project exposure and visual modification class.

- *Sensitivity: Moderate.*
- *Project Exposure: High.*
- *Existing Visual Condition: VMC 1, Features Appear Congruent with the Prevailing Landscape Character and are Coherently Arrayed.*

In contrast to the No-Action Alternative, levees would be constructed under Alternative C to increase the river capacity in the Mendota Dam area. These levees would be within critical public views from the west shore near the Dam (and possibly from the Bass Avenue residential area). A fish ladder would also be constructed at Mendota Dam to provide fish passage, flashboards at Mendota Dam would generally be removed, and the dam's sill may be notched (see Section 2.2.7). The removal of the flashboards would lower water surface elevations in the San Joaquin River arm of Mendota Pool. This change in water surface elevations could have an adverse effect on visual resources. Changes proposed by Alternative C would be within the foreground of views from the west bank of the Mendota Dam area, where some fishing occurs. The introduction of Fresno Slough Dam would not have an adverse effect on visual resources in the Mendota Dam area due to distance and screening from Mowry Bridge. Nonetheless, modifications to Mendota Dam would be required under Alternative C that could affect critical public views. The Dam is highly visible in the immediate foreground of shore-based views in the Mendota Dam area. Therefore, the activities proposed under Alternative C would have an adverse effect on visual resources in the Mendota Dam area.

Nonetheless, the changes to the dam, the proposed infrastructure, and changes to water surface elevations are in keeping with the overall character of the Project area. The area is composed of water infrastructure, irrigation facilities, dams, bridges and other water control facilities. Over time changes that would occur under Alternative C would become part of the character of the area, as it is defined by agricultural uses and water control infrastructure.

When comparing Alternative C to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative C to No-Action). Based on the existing conditions and the proposed improvements, the impacts on visual resources are considered **less than significant** in the Mendota Dam area.

Impact VIS-5 (Alternative C): *Long-term Changes in the Visual Character or Quality of the Bass Avenue Residential Area.* Potential visual impacts for the public viewpoint at

the Bass Avenue residential area are described below based on sensitivity, Project exposure and visual modification class.

- *Sensitivity: Low.*
- *Project Exposure: Low.*
- *Existing Visual Condition: VMC1, Features Appear Congruent with the Prevailing Landscape Character and are Coherently Arrayed.*

Under Alternative C, construction of grade control structures in the river channel would occur near Bass Avenue residential area; however, the structures would only be exposed at low flows, and would be screened from view from the Bass Avenue residential area by existing vegetation along the left bank of the river. Compared to the No-Action Alternative, these views from the Bass Avenue residential area would be unchanged.

When comparing Alternative C to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraphs (i.e., the comparison of Alternative C to No-Action). There would be **no impact** on visual resources at the Bass Avenue residential area.

Impact VIS-6 (Alternative C): ***Substantial Changes in Light or Glare.*** Refer to Impact VIS-6 (Alternative A). Potential impacts of Alternative C would be the same as potential impacts of Alternative A. Impacts on visual resources from changes in light and glare are considered **potentially significant**.

Mitigation Measure VIS-6 (Alternative C): ***Require Conformance to Lighting Standards.*** Refer to Mitigation Measure VIS-6 (Alternative A). The same mitigation measures would be used under Alternative C as under Alternative A. The impact after mitigation would be **less than significant**.

Alternative D (Fresno Slough Dam with Wide Floodplain and North Canal)

Alternative D would include construction of Project features including Fresno Slough Dam, a levee system with a wide floodplain encompassing the river channel, and the North Canal. Other key features include construction of the Mendota Dam fish passage facility, the Fresno Slough fish barrier, the North Canal bifurcation structure with fish passage facility and fish screen, removal of the Chowchilla Bifurcation Structure, removal of San Mateo Avenue crossing, and Main Canal and Helm Ditch relocations. Construction activity is expected to occur intermittently over an approximate 158-month timeframe.

Impact VIS-1 (Alternative D): ***Construction Related Effects on the Visual Quality of the Project Site and Its Surroundings.*** Compared to the No-Action Alternative, implementation of Alternative D has the potential to result in short and long-term impacts on visual resources near construction activities from public view points. Under Alternative D, construction related effects on visual impacts would generally be the same as those described in Impact VIS-1 (Alternative C) with several exceptions. Unlike Alternative C, this alternative includes a North Canal structure and a wider floodplain, which would result in in potentially more construction related activities and degradation

of visual resources. Further, Project construction would take place over a longer time frame, 158 months; therefore construction would impact visual resources at the Project area for a longer duration.

When comparing Alternative D to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraph (i.e., the comparison of Alternative D to No-Action). Construction activities would impact the color, line, form and mass of visual resources in sensitive viewsheds. Although visual resources would not be permanently impacted during construction, due to their sensitivity, high exposure to the Project and the multi-year time frame of construction, impacts on visual resources are considered **potentially significant**.

Mitigation Measure VIS-1 (Alternative D): ***Minimize Visual Disruption from Construction Activities.*** Refer to Mitigation Measure VIS-1 (Alternative A). The same mitigation measures would be used under Alternative D as under Alternative A. The impact after mitigation would be **less than significant**.

Impact VIS-2 (Alternative D): ***Long-term Changes in the Visual Character or Quality of the San Mateo Avenue Crossing.*** Compared with the No-Action Alternative, Alternative D would remove existing facilities that would change the visual character and quality of the Project area at the San Mateo Avenue crossing. Alternative D impacts are similar in scope and scale with impacts of Alternative B, discussed above. The removal of the crossing would restore a continuous river channel in this vicinity and improve the overall natural character.

When comparing Alternative D to existing conditions, impacts to visual resources would be similar to those discussed in the preceding paragraph (i.e., the comparison of Alternative D to No-Action). Based on the existing conditions and the proposed improvements, the effects on visual resources are considered **beneficial**.

Impact VIS-3 (Alternative D): ***Long-term Changes in the Visual Character or Quality of the Mendota Pool Park Area.*** Refer to Impact VIS-3 (Alternative C). Potential impacts of Alternative D would be the same as potential impacts of Alternative C. The impacts on visual resources are **less than significant** in the Mendota Pool Park area.

Impact VIS-4 (Alternative D): ***Long-term Changes in the Visual Character or Quality of the Mendota Dam Area.*** Refer to Impact VIS-4 (Alternative C). Potential impacts of Alternative D would be the same as potential impacts of Alternative C. Impacts on visual resources are **less than significant** in the Mendota Dam area.

Impact VIS-5 (Alternative D): ***Long-term Changes in the Visual Character or Quality of the Bass Avenue Residential Area.*** Refer to Impact VIS-5 (Alternative C). Potential impacts of Alternative D would be the same as potential impacts of Alternative C. There would be **no impact** on visual resources at the Bass Avenue residential area.

Impact VIS-6 (Alternative D): ***Substantial Changes in Light or Glare.*** Refer to Impact VIS-6 (Alternative A). Potential impacts of Alternative D would be the same as potential

impacts of Alternative A. Impacts on visual resources from changes in light and glare are considered **potentially significant**.

Mitigation Measure VIS-6 (Alternative D): ***Require Conformance to Lighting Standards.*** Refer to Mitigation Measure VIS-6 (Alternative A). The same mitigation measures would be used under Alternative D as under Alternative A. The impact after mitigation would be **less than significant**.

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25.0 Cumulative Impacts

This chapter provides an analysis of cumulative effects of the Project alternatives taken together with other past, present, and reasonably foreseeable probable future projects (or actions), as required by National Environmental Policy Act (NEPA) implementing regulations (40 Code of Federal Regulations [CFR] Section 1508.7) and California Environmental Quality Act (CEQA) Guidelines (Cal. Code Regs., tit. 14, § 15130). This analysis follows applicable guidance provided by the Council on Environmental Quality (CEQ) in *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997) and *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (CEQ 2005) and is consistent with the cumulative impact analysis in the Program Environmental Impact Statement/Report (PEIS/R) (San Joaquin River Restoration Program [SJRRP] 2011, pages 26-1 to 26-33). Direct and indirect impacts of implementing the Project are presented in greater detail in the resource-specific chapters, including Chapter 4.0, "Air Quality," through Chapter 24.0, "Visual Resources."

25.1 Definitions of Cumulative Effects

The CEQ regulations that implement NEPA provisions define cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR Section 1508.7). Individual effects from different activities may add up or interact to cause additional effects not apparent when considering the individual effects one at a time. Additional effects contributed by actions unrelated to the proposed action must be included in the analysis of cumulative effects. These effects can be either adverse or beneficial.

Cumulative impacts are defined in State CEQA Guidelines section 15355 as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." A cumulative impact occurs from "the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time" (Cal. Code Regs., tit. 14, § 15355, subd. (b)).

State CEQA Guidelines section 15130 requires that an Environmental Impact Report (EIR) determine whether the project's incremental effect is "cumulatively considerable." The definition of cumulatively considerable is provided in California Code of Regulations, Title 14, section 15065, subdivision (a)(3):

> *"Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.*

Consistent with State CEQA Guidelines section 15130, subdivision (a), the discussion of cumulative impacts in this chapter focuses on significant and potentially significant cumulative impacts. The State CEQA Guidelines (Cal. Code Regs., tit. 14, § 15130, subd. (b)) state the following:

> *The discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion should be guided by the standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact.*

25.2 Methods and Assumptions

Although NEPA guidelines do not provide specific guidance on how to conduct a cumulative impact analysis, associated actions (past, present, or future) that, when viewed with the proposed or alternative actions, may have significant cumulative impacts were identified. Cumulative impacts should not be speculative, but should be based on known long-range plans, regulations, or operating agreements. Cumulative impacts consider Project-level actions together with other past, present, and reasonably foreseeable probable future actions.

The State CEQA Guidelines identify two basic methods for establishing the cumulative environment in which a project is to be considered: the use of a list of past, present, and probable future projects (the "list approach") or the use of adopted projections from a general plan, other regional planning document, or certified EIR for such a planning document (the "plan approach"). For this cumulative effects analysis, the list approach and the plan approach have been combined in qualitative assessments of cumulative effects to generate the most comprehensive future projections possible, consistent with the SJRRP PEIS/R (SJRRP 2011, page 26-2).

Effects of past, present, and reasonably foreseeable probable future actions were assessed qualitatively for all resource areas. Existing information on current and historical conditions was used to evaluate the combined effects of past actions on each resource area. For present and reasonably foreseeable probable future actions, a list of related actions was compiled. The combined effects of these past, present, and reasonably foreseeable probable future actions, and of the actions that were evaluated quantitatively, were then evaluated together with those of the Project alternatives. The combined effects

of past actions and the list of related present and reasonably foreseeable probable future projects are described below.

For purposes of this Environmental Impact Statement/Report (EIS/R), the Project would have a significant cumulative effect if:

1. The cumulative effect of related projects (past, current, and probable future projects) without the project are not significant and the project's incremental impact is substantial enough, when added to the cumulative effects, to result in a significant impact.
2. The cumulative effects of related projects (past, current, and probable future projects) without the project are already significant and the project contributes considerably to the effect. The standards used herein to determine considerability are either that the impact must be substantial or must exceed an established threshold of significance.

25.2.1 Past and Present Actions

A large number of past and present actions have occurred in the Restoration Area. The effects of these past and present actions have strongly influenced existing conditions, and some past actions created "legacies" that are still affecting resources. The following are the most important of these past and present actions:

- Population growth and associated development of socioeconomic resources and infrastructure.
- Water development actions.
- Conversion of natural vegetation to agricultural and developed land uses.
- Introduction of nonnative plant and animal species.
- Resource extraction (e.g., mining and timber harvest).

25.2.2 Reasonably Foreseeable Probable Future Actions

Reasonably foreseeable probable future actions are actions that are currently under construction, approved for construction, or in final stages of formal planning at the time of preparation of this EIS/R.

The reasonably foreseeable probable future actions considered in this cumulative effects analysis are actions located within the Restoration Area that have been identified as potentially having an effect on resources that also may be affected by the Project. These actions were identified by the list of plans and projects included in the Draft PEIS/R for each resource (SJRRP 2011, Table 26-1), included here in Table 25-1, and by compiling and then considering a preliminary list of additional actions within 5 miles of Reach 2B and Mendota Pool Bypass through reviewing available information regarding planned projects in the vicinity of the Project area.

Table 25-1.
Reasonably Foreseeable Future Actions Included in the Qualitative Analysis of Cumulative Resource Area Effects in the PEIS/R

Project	Surface Water Supplies and Facilities Operations	Surface Water Quality	Flood Management	Groundwater	Fisheries	Vegetation and Wildlife	Geology and Soils	Paleontological Resources	Cultural Resources	Indian Trust Assets	Land Use Planning and Agricultural Resources	Recreation	Power and Energy	Visual Resources	Utilities and Service Systems	Public Health and Hazardous Materials	Transportation and Infrastructure	Air Quality	Climate Change	Noise	Socioeconomics
Conveyance Programs																					
Bay-Delta Conservation Plan and Alternative Delta Conveyance Facilities	√	√			√																√
Delta-Mendota Canal/California Aqueduct Intertie		√															√				√
Delta-Mendota Canal Project Recirculation		√															√				√
Lower San Joaquin Flood Improvement Project			√		√												√				
North Delta Flood Control and Ecosystem Restoration Project					√																
South Delta Improvements Program	√	√			√																
Franks Tract Project		√			√								√								
Two Gates Fish Protection Demonstration Project	√	√			√	√	√		√		√	√		√		√	√	√		√	√
Drinking Water Quality Programs																					
Bay Area Water Quality and Supply Reliability Program																					√
North Bay Aqueduct Alternative Intake Project					√																
San Luis Reservoir Low Point Improvement Project		√																			
South Bay Aqueduct Improvement and Enlargement Project																	√				√
In-Delta Storage Program (Delta Wetlands Project)		√			√																

Table 25-1.
Reasonably Foreseeable Future Actions Included in the Qualitative Analysis of Cumulative Resource Area Effects in the PEIS/R

Project	Surface Water Supplies and Facilities Operations	Surface Water Quality	Flood Management	Groundwater	Fisheries	Vegetation and Wildlife	Geology and Soils	Paleontological Resources	Cultural Resources	Indian Trust Assets	Land Use Planning and Agricultural Resources	Recreation	Power and Energy	Visual Resources	Utilities and Service Systems	Public Health and Hazardous Materials	Transportation and Infrastructure	Air Quality	Climate Change	Noise	Socioeconomics
Los Vaqueros Reservoir Expansion Project		√											√								
North-of-the-Delta Offstream Storage Investigation (Sites Reservoir)	√				√								√								
Shasta Lake Water Resources Investigation (Shasta Reservoir Enlargement)	√				√								√								
Upper San Joaquin River Basin Storage Investigation	√	√		√	√								√	√							
Other Water Resources Projects																					
California Water Plan	√	√		√															√		
Conditional Waiver of Waste Discharge Requirements for Irrigated Lands		√									√										
Conveyance of Refuge Water Supply, South San Joaquin Valley Study Area, Mendota Wildlife Area						√								√		√					
FloodSAFE California			√																		
Folsom Dam Safety and Flood Damage Reduction Project			√																		
Long-Term CVP and SWP Operations	√	√			√																
Red Bluff Diversion Dam Pumping Plant					√																
Sacramento River Water Reliability Study					√									√							
San Joaquin River Salinity Management Plan		√				√															
San Joaquin River Water Quality Improvement Project		√			√	√									√		√				

Table 25-1.
Reasonably Foreseeable Future Actions Included in the Qualitative Analysis of Cumulative Resource Area Effects in the PEIS/R

Project	Surface Water Supplies and Facilities Operations	Surface Water Quality	Flood Management	Groundwater	Fisheries	Vegetation and Wildlife	Geology and Soils	Paleontological Resources	Cultural Resources	Indian Trust Assets	Land Use Planning and Agricultural Resources	Recreation	Power and Energy	Visual Resources	Utilities and Service Systems	Public Health and Hazardous Materials	Transportation and Infrastructure	Air Quality	Climate Change	Noise	Socioeconomics
South Delta Flood Bypass		√	√												√						
Tracy Fish Collection Facility and Tracy Fish Facility Improvement Program					√										√						
Resource Management Plans and Programs																					
Central Valley Joint Venture						√															
Central Valley Project Improvement Act		√			√									√							
Ecosystem Restoration Program					√	√								√		√					
Comprehensive Conservation Management Plans for National Wildlife Refuges						√					√			√		√					
Habitat Management Preservation, and Restoration Plan for Suisun Marsh						√								√		√					
Jensen River Ranch Habitat Enhancement and Public Access Project		√				√								√		√					
Lost Lake Park Master Plan						√						√			√		√				
Millerton Lake Resource Management Plan/General Plan						√								√							
Peoria Wildlife Management Area						√								√		√					
Riparian Habitat Joint Venture						√								√							
San Joaquin River Parkway Plan											√	√		√			√				
Vernalis Adaptive Management Program	√	√			√																
New Friant River Outlet Powerhouse													√		√						

Table 25-1.
Reasonably Foreseeable Future Actions Included in the Qualitative Analysis of Cumulative Resource Area Effects in the PEIS/R

Project	Surface Water Supplies and Facilities Operations	Surface Water Quality	Flood Management	Groundwater	Fisheries	Vegetation and Wildlife	Geology and Soils	Paleontological Resources	Cultural Resources	Indian Trust Assets	Land Use Planning and Agricultural Resources	Recreation	Power and Energy	Visual Resources	Utilities and Service Systems	Public Health and Hazardous Materials	Transportation and Infrastructure	Air Quality	Climate Change	Noise	Socioeconomics
Development Projects																					
Fresno County General Plan		√				√	√				√			√	√	√	√	√		√	
Madera County General Plan Policy Document		√				√	√				√			√	√	√	√	√		√	
Merced County General Plan		√				√	√				√			√	√	√	√	√		√	
City of Fresno General Plan		√				√	√				√			√	√	√	√	√		√	
Brighton Crest		√					√				√			√		√	√	√			
Gunner Ranch West Specific Plan		√					√				√			√		√	√	√			
Ventana Annexation		√					√				√			√		√	√	√			
Gateway Village Specific Plan		√					√				√			√		√	√	√			

Key:
CVP = Central Valley Project
Delta = Sacramento-San Joaquin Delta
SWP = State Water Project

Additional actions within 5 miles of Reach 2B were evaluated for inclusion in the cumulative effects analysis based on three criteria that all must be met to be considered to be reasonably foreseeable:

- The action has an identified sponsor actively pursuing project development, has completed or issued NEPA and/or CEQA compliance documents such as a Draft or final EIS or EIR, and appears to be "reasonably foreseeable" given other considerations such as site suitability, funding and economic viability, and regulatory limitations.
- Available information defines the action in sufficient detail to allow meaningful analysis.
- The action could affect resources potentially affected by the Project.

Based on this review, the effects of the actions listed in Table 25-1 and additional actions described below were qualitatively considered in the assessment of the cumulative effects of the Project. The list in Table 25-1 is organized into three categories of actions, all of which were considered together when determining potential cumulative effects: water resources projects, resource management plans and programs, and development projects. (See PEIS/R [SJRRP 2011, pages 26-9 to 26-33] for a description of the projects listed in Table 25-1.)

Central Valley Power Connect, Segment 24

Pacific Gas and Electric (PG&E) is considering route options for the Central Valley Power Connect project, including options that cross the San Joaquin River north of the city of San Joaquin. The Central Valley Power Connect would include construction of a new 230,000 volt electric transmission line connecting the Gates substation east of Coalinga and the Gregg substation northwest of Fresno. The transmission line would span about 70 miles through portions of Fresno, Kings and Madera counties. Route options near the city of Mendota (Segment 24) are no longer proposed at this time.

Long-Term Water Transfers, Central Valley and Bay Area, California

The Department of Interior, Bureau of Reclamation (Reclamation) and the San Luis & Delta-Mendota Water Authority have issued, in August 2014, a draft EIS/R analyzing water transfers to the Central Valley Project (CVP) contractors south of the Delta and in the San Francisco Bay area from CVP and non-CVP sources from north of the Delta using Delta pumps (both CVP and State Water Project (SWP) facilities). Water transfers would occur through various methods such as groundwater substitution, cropland idling, reservoir release, and conservation, and would include individual and multiyear transfers from 2015 through 2024.

Mendota General Plan Update

The City of Mendota has issued a final EIR that describes the potentially significant environmental impacts associated with buildout of the City's 2005-2025 General Plan Update. The General Plan Update contains a comprehensive update to the City's land use, circulation, open space and conservation, noise, and safety elements. A notice of determination (NOD) was filed in August 2009.

2030 Firebaugh General Plan

The Final EIR for the 2030 Firebaugh General Plan was adopted by Firebaugh's city council in January 2010. The 2030 Firebaugh General Plan is a comprehensive update of six elements of the Firebaugh General Plan, including land use, circulation, conservation, open space, noise and safety. The planning time frame is through the year 2030.

State Route (SR) 33 Intersection Improvements

SR 33 is a north/south State highway that bisects the western portion of the City of Mendota. The SR 33 Intersection Improvements project proposes to construct a new intersection at SR 33 and Lozano Street and improve two existing intersections at SR 33 and Bass and Belmont Avenue. Upon completion of proposed projects within the City, traffic would likely increase to three times the existing level on SR 33. Improvement to key intersections and the construction of a new intersection would accommodate this future increase and maintain the current level of service of the City's circulation system. A NOD for this project was filed in March 2009.

SR 180 Westside Expressway Route Adoption Study

The California Department of Transportation proposes to adopt a new expressway corridor for SR 180 between Interstate 5 and Valentine Avenue in west Fresno. Three proposed route adoption alternatives together with additional route variations and the No-Action/No-Project Alternative are under consideration. The Final EIR was certified and a NOD was filed in March 2013.

Gill Ranch Gas Storage Project

The Gill Ranch Gas Storage project would develop approximately 20 acres of surface facilities including a 10-acre central compressor station, gas injected withdrawal wells, fields gathering lines, observation wells, a 26.7-mile 30-inch-diameter gas transmission pipeline, and 9.3-mile electric power line. There are five locations where the 30-inch gas pipeline crosses water features. These locations are: Fresno Slough Overflow "Feature 16," Fresno Slough Overflow "Feature 16A," Fresno Slough "Feature 17," San Joaquin River, and Lone Willow Slough-Chowchilla Canal Bypass. A Mitigated Negative Declaration (MND) was certified in 2009. Construction began in January 2010. Post-construction restoration in areas of natural habitat disturbance, as well as facility operations compliance activity, is underway.

San Joaquin River Bank Repair Project

The City of Firebaugh is proposing to repair an approximate 300-foot-long portion of the west bank of the San Joaquin River that was damaged by flooding in 2006. The repair strategy consists of installation of a sheet pile/Reno Mattress system. A NOD was filed in February 2010.

Grassland Bypass Project

The continuation of Grassland Bypass Project 2010–2019, as described in the final EIS/R, allows the Grassland Area Farmers additional time to complete agricultural drainage collection and treatment from the 97,400-acre Grassland Drainage Area with discharges of a portion of the drainage to the San Luis Drain. This drainwater must meet increasingly stringent selenium load requirements for discharges to Mud Slough. At

present, Reclamation is assisting with implementation of a pilot project for the final treatment component. Construction of the pilot plant is underway. In addition, the Grassland Area Farmers will continue to test various treatment processes for management of the final fraction of the drainage from the drainage reuse facility, which is needed to comply with the waste discharge requirements.

20-Year Extension of the 2005 Mendota Pool Exchange Agreement

The Mendota Pool 10-year Exchange Agreements that are currently in place span the years 2005 to 2014, and an extension of the agreements is necessary for Mendota Pool Group farmers to continue this exchange after 2014. The proposed extension would allow Mendota Pool Group farmers in the Mendota Pool area to continue to pump up to 26,250 acre-feet per year of groundwater of suitable quality into the Mendota Pool for exchange of up to 25,000 acre-feet per year CVP water delivered to the San Luis Canal for use by Mendota Pool Group farmers in the San Luis Canal service area of San Luis Water District and Westlands Water District when the existing agreements expire.

San Joaquin River National Blueway

The America's Outdoor Initiative was launched in 2010 and calls for multiple Federal agencies, including the Department of Interior, to implement projects that would promote conservation and recreation on public lands. One of the proposed projects under this initiative is the San Joaquin River National Blueway. The San Joaquin River National Blueway is an integrated system of "parks, wildlife refuges, and other publicly accessible places that provides the public an opportunity to explore and enjoy the San Joaquin River from its headwaters to the Delta" (San Joaquin River Partnership 2011). Recreation opportunities offered by the San Joaquin River National Blueway include boating, swimming, picnicking, walking and jogging, cycling, hiking, interpretive trails, wildlife viewing, bird watching, fishing and hunting. The San Joaquin River National Blueway plan identifies Fresno Slough (near the Mendota Wildlife Area) as an existing access site.

25.3 Significance Criteria

Two significance criteria must be met for an environmental consequence to have a significant cumulative impact: 1) the effect must make a cumulatively considerable incremental contribution to an overall cumulative impact, and 2) the overall cumulative impact (considering past, present, and reasonably foreseeable probable future projects) must be significant. These criteria are based on the State CEQA Guidelines as amended and the 1997 guidelines prepared by the CEQ, *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997).

25.4 Mitigation Measures for Significant Cumulative Impacts

To reduce any cumulatively considerable incremental contributions from Project alternatives to an overall cumulative impact, feasible mitigation measures were proposed for all potentially significant and significant direct and indirect effects; these measures are presented in the individual resource sections. It was not feasible to reduce any of the

overall significant cumulative impacts (in no case was a Project alternative's incremental contribution the reason for an overall significant cumulative impact). Therefore, no further feasible mitigation could be applied to reduce significant, or potentially significant, overall cumulative impacts to less-than-significant levels. In this case, the cumulative impacts are considered to be significant and unavoidable.

25.5 Cumulative Effects Analysis

The cumulative effects analysis is described below for each resource area. The analysis of cumulative impacts for all resource areas is based on effects of past, present, and reasonably foreseeable probable future actions in the Restoration Area. The concern is whether small incremental effects from the Project when combined with the other approved future plans and projects in the Project area and vicinity would lead to a significant cumulative impact in the region.

Given the number of actions that are common to all Project alternatives and that the actions in the Settlement are relatively fixed, there would be minimal differences between Project alternatives with respect to cumulative effects. Therefore, the cumulative effects analysis applies to all Project alternatives. Several impacts were determined to have the potential to result in a cumulatively considerable incremental contribution to a significant cumulative impact. These impacts are described in the subsequent sections, and include the following:

- **Air Quality**: Effect to sensitive receptors during Project construction.
- **Cultural Resources:** Potential losses of archaeological resources.
- **Environmental Justice:** Regional economic factors that are adversely affecting minority and/or low-income populations.
- **Land Use Planning and Agriculture:** Conversion of agricultural land to non-agricultural uses.
- **Socioeconomics and Economics:** Substantial short term economic impacts associated with reduced agricultural production in the region.

Table 25-2 presents a summary of impacts where the impact was determined to make a cumulatively considerable incremental contribution to an overall significant cumulative impact.

Table 25-2.
Project Impacts with the Potential to Result in Cumulatively Considerable Incremental Contributions to Significant Cumulative Impacts

Resource Area	Impact
Air Quality	Exposure of sensitive receptors to Project inputs and additional industrial sources, construction projects, and vehicles on roadways in the Project area
Cultural Resources	Disturbance or destruction of cultural resources
Environmental Justice	Regional economic factors that are adversely affecting minority and/or low-income populations
Land Use Planning and Agriculture	Conversion of designated Farmland to nonagricultural uses
Socioeconomics and Economics	Substantial short term economic impacts associated with losses in agricultural production
Transportation and Traffic	Temporary or permanent road closure(s) that could affect emergency access or emergency response times

25.5.1 Air Quality

Cumulative effects on air quality could occur at the local, regional, and global scales. The cumulative effects at the local and regional scales are discussed in this section; cumulative effects at the global scale are discussed separately in Section 25.5.5.

In the context of air quality, applicable plans and projects for the cumulative effects analysis include several roadway improvement projects (including the SR 33 Intersection Improvements project and the SR 180 Westside Expressway Route Adoption Study), General Plan or Specific Plan updates for nearby cities (including the cities of Mendota and Firebaugh), Gill Ranch Gas Storage Project, and other various infrastructure and water improvement projects. At the local level, the city of Mendota General Plan Update also has implications for air quality near the Project area with its goals to expand residential housing, commercial buildings and industrial facilities.

The addition of industrial sources, construction equipment associated with new residential and commercial buildings, and vehicles on roadways in the Project area and vicinity would result in increases of criteria air pollutants and toxic air contaminants. These air pollutants would add to the current air quality problems, in particular for Reactive Organic Gases (ROGs), nitrogen oxides (NO_x), particulate matter with an aerodynamic resistance diameter of 10 micrometers or less (PM_{10}) and fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less ($PM_{2.5}$), which have caused the San Joaquin Valley Air Basin to be designated as non-attainment for Federal and State Ambient Air Quality Standards. The San Joaquin Valley Air Pollution Control District (SJVAPCD) has several plans, regulations, and incentive programs to address the air quality problems. However, the reduction in emissions relies upon numerous agencies to assist in reducing the emissions in the air basin to an appropriate level. This includes Federal and State regulations to improve vehicle emission standards, driving habits of individuals, and pollution control of point sources by industry. Since the Project construction would mitigate on-site and off-set any remaining exhaust emissions, the Project alternatives would not contribute to an increase in regional emissions that

conflicts with the budget used for regional air quality planning. Therefore, the Project would not provide a cumulatively considerable incremental contribution to the cumulative air quality impact.

The addition of industrial sources, construction projects, and vehicles on roadways can affect sensitive receptors in the Project Area. Because Project construction would result in a significant impact to sensitive receptors, even after implementation of mitigation measures, Project alternatives would result in a cumulatively considerable incremental contribution to a significant cumulative air quality impact to sensitive receptors during Project construction.

The Project is not anticipated to have a significant amount of emissions once Project construction is complete. Therefore, implementation of Project alternatives (Project operation over the long term) would not provide a cumulatively considerable incremental contribution to a significant cumulative impact on air quality and sensitive receptors during Project operation.

The cumulative impact to odors would be less than significant since there are no major sources of odors associated with the Project.

In summary, all Action Alternatives would only result in **one potentially significant and unavoidable cumulative air quality impact**, the effect to sensitive receptors during Project construction.

25.5.2 Biological Resources – Fisheries

In the context of fisheries cumulative effects analysis, applicable plans and projects referenced in the PEIS/R (SJRRP 2011, pages 26-3 to 26-33) include:

- Bay-Delta Conservation Plan and Alternative Delta Conveyance Facilities.
- Lower San Joaquin Flood Improvement Project.
- North Delta Flood Control and Ecosystem Restoration Project.
- South Delta Improvements Program.
- Franks Tract Project.
- Two Gates Fish Protection Demonstration Project.
- North Bay Aqueduct Alternative Intake Project.
- In-Delta Storage Program (Delta Wetlands Project).
- North-of-the-Delta Offstream Storage Investigation (Sites Reservoir).
- Investigation (Shasta Reservoir Enlargement).
- Upper San Joaquin River Basin Storage Investigation.
- Long-Term CVP and SWP Operations.
- Red Bluff Diversion Dam Pumping Plant.
- Sacramento River Water Reliability Study.

- San Joaquin River Water Quality Improvement Project.
- Tracy Fish Collection Facility and Tracy Fish Facility Improvement Program.
- Central Valley Project Improvement Act (CVPIA).
- Ecosystem Restoration Program.
- Vernalis Adaptive Management Program (which expired in 2011).

At the local level, the Gill Ranch Gas Storage Project may also have implications for fisheries near the Project Area, but with construction complete and no incidental take permit required, only post-construction restoration of natural habitat disturbance remains.

None of the cumulative projects or plans referenced in the PEIS/R would likely adversely affect fisheries conditions in the Project area based on their location relative to the Project and their intention to improve aquatic habitat conditions. Many programs occur downstream within the Bay-Delta, while others occur elsewhere in the Central Valley (e.g., Sacramento River basin). Many activities currently underway or that are reasonably certain to occur in the future are intended to improve aquatic habitat conditions. These activities include the implementation of the CVPIA and the Ecosystem Restoration Program, which would improve and restore fish and wildlife habitat. Through these programs, the populations of aquatic resources are expected to improve in the long term. Other projects, programs, and plans that are currently underway or are reasonably certain to occur in the near future could further benefit salmonids and other native fish species. These projects, programs, and plans include resource management plans and the Vernalis Adaptive Management Program (if continued past 2011) to protect, restore, and enhance fish and wildlife in the Central Valley and the Bay-Delta ecosystems. None of the cumulative projects or plans referenced in the PEIS/R would adversely affect fisheries conditions in the Project area as all the potential effects would either be beneficial or would not impact fisheries.

As noted in Section 5.3.3, construction activity in the active channel under all the Project alternatives could result in small, incremental adverse impacts on aquatic species, including crushing, disturbance of organisms, release of sediment, and release of pollutants associated with ground disturbance or equipment operation. These effects would be minimized by the use of cofferdams installed during low flow conditions and fish removal from the construction areas prior to installation. Water from dewatered construction sites would be placed in settling basins or treated prior to release into the river or Mendota Pool. No other notable cumulative projects would contribute to this incremental effect; therefore, the effect is not cumulatively considerable.

As noted in Section 5.3.3, Alternatives A and D would allow for agricultural use on the expanded floodplains within the levees. The majority of the expanded floodplain would become inundated about every two years at flows of around 2,500 cubic feet per second (cfs) and higher. While flooding of a native floodplain may improve rearing habitat for outmigrating juvenile salmonids, agricultural activities may introduce contaminants (fertilizers, pesticides) directly to the floodplain where they could potentially become entrained in the flow and affect juvenile fish rearing in Reach 2B or in downstream reaches. No other notable cumulative projects would contribute to this effect.

Based on the information presented above, there are no projects or programs that when combined with the less-than-significant impacts anticipated with the Project (as outlined in Section 5.3.3) would result in cumulatively considerable impacts. In summary, **no cumulatively considerable contribution** to impacts to fisheries resources are expected under any of the Project alternatives incorporating floodplain agricultural activities (i.e., Alternatives A and D).

25.5.3 Biological Resources – Vegetation

Several future actions have the potential to affect special-status vegetation alliances in Reach 2B. These actions include a number of restoration programs and plans from which native vegetation resources in the area would benefit. In the context of sensitive vegetation alliances, applicable plans and projects identified in the PEIS/R and Section 25.2.2 include:

- Conveyance of Refuge Water Supply, South San Joaquin Valley Study Area, Mendota Wildlife Area.
- San Joaquin River Salinity Management Plan.
- San Joaquin River Water Quality Improvement Project.
- Comprehensive Conservation Management Plans for National Wildlife Refuges.
- Riparian Habitat Joint Venture.
- San Joaquin River Bank Repair Project.
- Fresno County General Plan.
- Madera County General Plan.

None of these plans is in conflict with the goals and intent of the Project. They include plans to ensure water deliveries to the Mendota Wildlife Area, improve water quality in the San Joaquin River, coordinate efforts to restore habitats and manage wildlife, and develop agriculture, while protecting water quality and natural habitat. Implementation of these plans may be phased over many years, and may depend on the availability of funding or other resources. The benefits realized by these future plans may take years to be implemented.

In contrast, the adverse effects on sensitive vegetation alliances caused by the spread of non-native invasive plant species and further degradation of habitat are likely to increase over time. Other projects could facilitate the dispersal and establishment of invasive plants in several ways: through transporting invasive plants' propagules into the Project area; creating bare ground for them to establish, by altering hydrology in a manner that is advantageous to invasive plant species, and eliminating competing native vegetation.

The cumulative significant adverse impact on existing sensitive vegetation alliances are primarily caused by other past and present actions and inactions. However, some beneficial effects would occur in areas upstream of San Mateo Avenue crossing where riparian habitat would mature.

Implementing any of the Project alternatives would result in some less than significant adverse impacts, as well as in numerous beneficial effects on sensitive vegetation alliances. Most adverse effects to sensitive vegetation alliances would be local in scale and temporary, occurring during construction of Project infrastructure. The extensive conservation measures would reduce or minimize potential adverse effects. The beneficial effects of the Project alternatives would be regional and cumulative. For all Project alternatives, it is expected that restoration activities would improve sensitive vegetation alliance conditions within and along the river. Control of invasive plant species would enhance the diversity and extent of sensitive vegetation alliances throughout Reach 2B. Over time, native riparian vegetation would mature, prevent invasive exotic species to take hold by shading them out, and continue to contribute to the formation and expansion of high quality sensitive vegetation alliances in the area. As a consequence, the overall effect of the implementation of Project alternatives on sensitive vegetation alliances would be beneficial and the Project would not contribute incrementally to any significant adverse cumulative effects.

In summary, with implementation of the conservation strategy of the Project, the Project effects would be beneficial with a range from negligible to substantial benefits for sensitive vegetation alliances. There would **not be a cumulatively considerable contribution** to a cumulative impact on sensitive vegetation alliances.

25.5.4 Biological Resources – Wildlife

Past actions by humans have substantially changed wildlife populations and wildlife habitat in the Project area and vicinity, as compared to historical conditions. The most important of these past actions have been the conversion of natural vegetation to agricultural and developed land uses, water diversions, and the introduction of nonnative plant and animal species. These changes have resulted in overall significant adverse effects on ecosystems and the wildlife that depend on them.

Several reasonably foreseeable future actions also have the potential to affect wildlife populations and wildlife habitat in the Project area and vicinity. These actions include a number of restoration programs and plans from which vegetation and wildlife resources would benefit. In the context of wildlife, applicable plans and projects referenced in the PEIS/R and Section 25.2.2 include:

- Conveyance of Refuge Water Supply, South San Joaquin Valley Study Area, Mendota Wildlife Area.
- San Joaquin River Salinity Management Plan.
- San Joaquin River Water Quality Improvement Project.
- Comprehensive Conservation Management Plans for National Wildlife Refuges.
- Riparian Habitat Joint Venture.
- Fresno County General Plan.
- Madera County General Plan.

None of these plans is in conflict with the goals and intent of the Project. They include plans to ensure water deliveries to the Mendota Wildlife Area, improve water quality in the San Joaquin River, coordinate efforts to restore habitats and manage wildlife, and develop agriculture while protecting water quality and habitats. Implementation of these plans may be phased over many years and dependent on the availability of funding or other resources. The benefits realized by these future plans may take years to come about. The list of additional projects contained in Section 25.2.2 have been considered as well and, at the local level, general plan updates for nearby cities (including the cities of Mendota and Firebaugh) could also benefit wildlife in the Project Area.

In contrast, the adverse effects on vegetation and wildlife caused by the spread of invasive species and further degradation of habitat are likely to increase over time. Other projects could facilitate the dispersal and establishment of invasive plants in several ways: through transporting invasive plants' propagules into the Project area; creating bare ground for them to establish; by altering hydrology in a manner that is advantageous to invasive plant species; and eliminating competing native vegetation. These other past, present, and future projects would have a cumulative significant adverse effects on riparian vegetation and other sensitive habitats, wetlands, and special-status plant and wildlife species. However, some beneficial effects would occur in areas upstream of San Mateo Avenue crossing where riparian habitat would mature.

Implementing any of the Project alternatives would result in both adverse and beneficial effects on wildlife. Most adverse effects to wildlife would be local in scale and temporary, occurring during construction of Project infrastructure. Conservation measures would reduce or minimize potential adverse effects. The beneficial effects of the Project alternatives would be regional and cumulative. For all Project alternatives, it is expected that restoration activities would improve habitat conditions within and along the river. Control of invasive plant species would also enhance these habitats throughout Reach 2B. Over time, riparian vegetation would mature and continue to provide habitat. As a consequence, the overall effect of the implementation of Project alternatives on wildlife would be beneficial, and would not make a considerable contribution to cumulative effects on wildlife. Thus, the Project would not contribute to a significant adverse cumulative effect.

In summary, with implementation of the restoration features/elements and Conservation Strategy of the Reach 2B restoration plan, the Project effects would be beneficial with a range from negligible to substantial benefits for wildlife species. There would **not be a cumulatively considerable contribution** to a cumulative impact on special-status animal species.

25.5.5 Climate Change and Greenhouse Gas Emissions

The emissions from one project, even a very large project, are miniscule in comparison to worldwide or even statewide greenhouse gas (GHG) emissions. However, the California State Lands Commission (CSLC) has concluded that the emissions from each project have an incremental contribution to the buildup of GHGs in the atmosphere and may have a significant environmental impact when analyzed on a cumulative basis. Cumulative impacts are those resulting from the incremental impact of the project when

added to other past, present, and reasonably foreseeable probable future projects (Cal. Code Regs., tit. 14, § 15355, subd. (b)). Therefore, CSLC practice on a case-by-case basis is to analyze the significance of GHG emissions as part of the cumulative impacts analysis (Cal. Code Regs., tit. 14, § 15130, subd. (f)).

Cumulative impacts associated with climate change and GHG emissions are discussed in Section 8.3.3. The Project could result in an incremental impact from GHG emissions associated with construction of the Project; however, mitigation measures would be implemented to reduce these impacts to a less than significant level. Therefore, there **would not be a cumulatively considerable contribution** to a significant cumulative impact on climate change.

25.5.6 Cultural Resources

Applicable plans and projects referenced in the PEIS/R and additional projects contained in Section 25.2.2 have been considered in the cumulative effects analysis and, at the local level, the San Joaquin River Bank Repair Project would have ground disturbing activities that have the potential to encounter cultural resources in riverbank and floodplain areas.

Under the cumulative condition, cultural resources would continue to be affected in the Central Valley rural areas due to growth, changes in land use, and ground disturbance. Adverse effects on eligible resources could result in the neglect, abandonment, or removal of historic properties. A given project is not likely to be able to avoid impacts to known or unknown cultural resources, especially in the case of a project that requires major ground disturbance. Development would likely result in further unearthing of sensitive archaeological resources, disturbance of traditional cultural properties, disturbance and possible damage to paleontological resources, and removal of—or changes to—the historic character and settings of historic resources. Potential cumulative impacts to archaeological resources were assumed to be significant for the purpose of this EIS/R.

Cultural resource archival and field survey investigations conducted within the Project area identified two previously recorded archaeological resource areas (considered historical resources under CEQA) that may be adversely affected by the Project. In addition, the Project area contains 13 buildings or groups of buildings and structures that required formal evaluations. All of these resources are located within Fresno or Madera counties and were constructed in or before 1965. Mendota Dam has been determined eligible for the National Register of Historic Places (National Register) and is listed in the California Register of Historic Resources (California Register). Additionally, Reclamation has found the Delta-Mendota Canal (DMC) individually eligible for the National Register (and California Register).

It is likely that known or unknown archaeological resources could be disturbed and cultural resources damaged or destroyed during construction activities for any of the Action Alternatives. Loss of a unique archaeological resource could occur where excavations encounter archaeological deposits that cannot be removed or recovered (e.g., under levees), or where recovery would not be sufficient to prevent the loss of the cultural material's significance. Although mitigation would be implemented to reduce

effects on potentially significant cultural resources, adverse effects, particularly on archaeological resources, may still occur. Losses of archaeological resources would add to a historical trend in the loss of these resources as artifacts of cultural significance and as objects of research importance; therefore, there is an overall significant cumulative impact on cultural resources along the San Joaquin River. Even with implementation of mitigation measures, the Project alternatives have the **potential to make a cumulatively considerable incremental contribution** to a significant cumulative impact on cultural resources along the San Joaquin River.

25.5.7 Environmental Justice

There are no applicable plans and projects referenced in the PEIS/R that relate to cumulative effects on environmental justice. For this analysis, economic factors that could affect minority and/or low-income populations in the region disproportionately are considered in the context of environmental justice.

Generally, the cumulative effects of the Project on environmental justice considerations in the Project area and vicinity are difficult to evaluate. The agriculture sector comprised nearly 14 percent of total employment in the two-county region in 2012 (see Section 21.1.3). Accordingly, it is clear that local farm workers play a large role in the economic vitality of the region. However, the regional economy has been adversely affected by the statewide economic recession as evidenced by relatively high unemployment rates. Both the statewide impacts on the agricultural industry and overall poor performance of the regional economy have been especially difficult for minority and low-income populations living in the region.

All of the Project alternatives would generate both incremental economic benefits (attributed to construction and operations spending) and adverse effects (attributed to decreases in agricultural production) on the regional economy that, when combined with similar effects from restoration of the other reaches of the San Joaquin River and other projects and economic conditions, could affect minority and/or low-income populations. However, the extent to which minority and/or low-income populations would realize these effects is unknown. Therefore, the cumulative effect of the Project on environmental justice considerations is difficult to ascertain, but it is conservatively assumed that implementation of the Project under all of the Action Alternatives (i.e., Alternatives A, B, C, and D) may cumulatively contribute to regional factors that are adversely affecting minority and/or low-income populations in the region and **potentially result in a cumulatively considerable incremental contribution** to disproportionately high and adverse effects on minority and low-income populations.

25.5.8 Geology and Soils

Impacts to geology and soils in the Project area could occur as a result of increased flows under the Program's reoperation of the Friant Dam for Restoration Flows. Impacts to geology and soils from implementing the Settlement in areas other than Reach 2B could include localized soil erosion, sedimentation, and inadvertent soil loss; loss of availability of a valuable mineral; and increased channel erosion, sediment transport, and meander migration; however, construction best management practices (BMPs) would be implemented to minimize the significance of these impacts.

Several potential changes could occur from other reasonably foreseeable probable future projects. In particular, U.S. Army Corps of Engineers (Corps) levee vegetation policy has the potential to affect geology and soils in the Project area. The April 2014 revised policy (Corps 2014) calls for the removal of vegetation from levees as necessary to maintain levee integrity and firefighting access. However, how the policy would be implemented in the Project area is not yet known. Implementation of this policy may result in removal of vegetation from the San Joaquin River channel that could result in localized erosion.

Implementing the Project alternatives would result in potential localized erosion and sedimentation in the Project area, particularly during channel construction, levee construction, and other ground-disturbing activities. Standard construction BMPs would be implemented in the Project area such as covering exposed slopes, installing silt fences, and placing straddles, among other accepted erosion control measures. Implementing the Project alternatives with these erosion control measures would result in some less-than-significant localized erosion and sedimentation transport. The Project alternatives, however, **would not result a cumulatively considerable incremental contribution** to the overall cumulative impact on San Joaquin River erosion and sedimentation

25.5.9 Hydrology – Flood Management

Projects that were identified in the PEIS/R and Section 25.2.2 that could have a cumulative effect on flood management include the Lower San Joaquin Flood Improvement Project, FloodSafe California, the South Delta Flood Bypass (see Table 25-1) and the San Joaquin River Bank Repair Project. The Lower San Joaquin Flood Improvement Project and the South Delta Flood Bypass projects would not be implemented near the Project area. FloodSafe California does not have any specific plans for Reach2B. San Joaquin River Bank Repair Project would be implemented near the Project area, but the effects of this project would be beneficial. Therefore, there are no past, present or foreseeable future projects that when combined with the effects from this Project would have adverse cumulative impacts to hydrology and flood management. Therefore, implementing the Project would **not make a cumulatively considerable incremental contribution** to a significant cumulative effect on flood management; the incremental contribution would be minor and the overall cumulative effect on flood management would continue to be beneficial.

25.5.10 Hydrology – Groundwater

Based on past, present, and reasonably foreseeable probable future actions, groundwater levels in the San Joaquin Valley are generally substantially reduced from historical levels and an overall significant cumulative impact exists on groundwater basins. Land subsidence has occurred throughout the San Joaquin Valley primarily due to aquifer-system compaction when groundwater levels decline, including areas near Mendota Pool. Consequently, past, present, and reasonably foreseeable probable future actions have caused an overall significant cumulative effect on the groundwater basin. However, the Project would not require increasing groundwater extraction but instead convert irrigated agricultural lands to floodplain areas. Therefore, Project alternatives would not result in a cumulatively considerable incremental contribution to groundwater extraction.

Groundwater extraction in the San Joaquin Valley has also resulted in changes to groundwater quality. Irrigation of crops along the west side of the San Joaquin Valley has resulted in localized areas of increased salts and trace metals in the shallow groundwater table. The San Joaquin River Water Quality Improvement Project would be expected to have a beneficial effect in the San Joaquin Valley by expanding the In-Valley Treatment/Drainage Reuse Facility. In contrast to other areas in the San Joaquin Valley, the Project area has relatively high quality groundwater with low salt concentrations (see Section 13.1.4). Within Reach 2B, there is not an overall significant cumulative impact on groundwater quality because of past, present, and reasonably foreseeable probable future actions.

Seepage and waterlogging of crops along the San Joaquin River have historically been an issue. High periodic streamflows and local flooding combined with shallow groundwater near the San Joaquin River have resulted in seepage-induced waterlogging damage to low lying farmland near the river. Seepage is highly variable and depends on annual hydrologic conditions. Within portions of Reach 2B, depth to groundwater is relatively shallow and has ranged from approximately 8 feet to 20 feet below ground surface (see Section 13.1.4). In agricultural areas near the river, there is an overall significant cumulative impact on groundwater because of past, present, and reasonably foreseeable probable future actions (without consideration of any incremental change due to the Project).

In the context of groundwater, applicable plans and projects referenced in the PEIS/R and Section 25.2.2 include the Upper San Joaquin River Basin Storage Investigation, the California Water Plan, the 20-Year Extension of the 2005 Mendota Pool Exchange Agreement, and Common Restoration actions, which are physical actions to achieve the Restoration Goal that would be implemented in other reaches. Additional projects considered in Section 25.2.2 include general plan updates, transportation projects, a pipeline project and a levee repair project, which overall may result in small effects to groundwater levels and groundwater quality that are not cumulatively considerable when taken together.

Under the Project alternatives, groundwater quality along the San Joaquin River in the Project area would not be substantially degraded. Therefore, Project alternatives would not result in a cumulatively considerable incremental contribution that would cause a significant cumulative impact on groundwater quality. Shallow groundwater levels along the San Joaquin River in the Project area would be monitored and flows would be managed to reduce potential waterlogging of crop root zones with implementation of the appropriate immediate mitigation measures. Therefore, Project alternatives would not cause a cumulatively considerable incremental contribution to a significant cumulative impact on shallow groundwater in the Project area. There are no other projects or programs that when combined with the less-than-significant groundwater impacts anticipated with the Project would result in cumulative impacts. In summary, the Project would **not result in a cumulatively considerable incremental contribution** that would cause cumulatively significant impacts to groundwater.

25.5.11 Hydrology – Surface Water Resources and Water Quality

Surface water quality in the Project vicinity has been affected by past and present projects through changes in land use and hydrologic conditions. Much effort has been expended to control discharges to the river and the levels and types of herbicides, fungicides, and pesticides that can be used in the environment. Over time, regulatory requirements for water quality in the river have become more stringent, and the number of locations along the river at which specific water quality objectives are identified and monitored has increased.

Impacts to surface water resources and water quality from implementing the Project would include localized soil erosion, channel erosion and sediment transport, and impacts to surface water quality from ground-disturbing construction activities. Construction BMPs would be implemented to minimize the significance of these impacts.

Future foreseeable projects included in the cumulative impacts analyses, including the Grassland Bypass Project and various total maximum daily load programs, would have a beneficial effect on surface water quality in the Project vicinity by managing the quality of runoff in the San Joaquin River watershed. In addition, other projects, such as the Upper San Joaquin River Basin Storage Investigation, could provide additional benefits. Construction activities within the watershed, however, could cause soil erosion and sedimentation of local drainages connecting to the San Joaquin River and the inadvertent introduction of construction-related substances into the San Joaquin River through site runoff or on-site spills. The effects of past, present, and reasonably foreseeable probable future actions have caused an overall significant cumulative impact on surface water quality in the San Joaquin River.

However, none of the projects or plans referenced in the cumulative analysis contained in the PEIS/R, or described in Section 25.2.2, would likely adversely affect surface water resources in the Project area based on their location relative to the Project and their intention to improve water quality conditions. Many programs occur downstream within the Bay-Delta, while others occur elsewhere in the Central Valley. Therefore, these projects or programs, when combined with the less-than-significant surface water resources impacts anticipated with the Project (as outlined in Section 14.3.3), would not result in cumulatively considerable impacts. In summary, the Project would **not result in a cumulatively considerable incremental contribution** that would cause cumulatively significant impacts to surface water resources under any of the Project alternatives (i.e., Alternatives A, B, C, and D).

25.5.12 Hydrology – Wetlands and Aquatic Resources

Several future actions have the potential to affect jurisdictional wetlands in Reach 2B. These actions include a number of restoration programs and plans from which jurisdictional wetland resources would benefit. In the context of jurisdictional wetlands, applicable plans and projects referenced in the PEIS/R and Section 25.2.2 include:

- Conveyance of Refuge Water Supply, South San Joaquin Valley Study Area, Mendota Wildlife Area.
- San Joaquin River Salinity Management Plan.

- San Joaquin River Water Quality Improvement Project.
- Comprehensive Conservation Management Plans for National Wildlife Refuges.
- Riparian Habitat Joint Venture.
- Fresno County General Plan.
- Madera County General Plan.

None of these plans is in conflict with the goals and intent of the Project. They include plans to ensure water deliveries to the Mendota Wildlife Area, improve water quality in the San Joaquin River, coordinate efforts to restore habitats and manage wildlife, and develop agriculture, while protecting water quality and habitats. Implementation of these plans (and the plans for restoration of the other reaches on the San Joaquin River under the No-Action Alternative) may be phased over many years, and may depend on the availability of funding or other resources. The benefits realized by these future plans may take years to be implemented.

Adverse effects on jurisdictional wetlands caused by the spread of non-native invasive plant species and further degradation of habitat have resulted from past actions and inactions and are likely to increase over time without invasive species management. Other projects could facilitate the dispersal and establishment of invasive plants in several ways: through transporting invasive plants' propagules into the Project area; creating bare ground for them to establish; altering hydrology in a manner that is advantageous to invasive plant species; and eliminating competing native vegetation. However, Program-level actions include management of invasive plant species in all Restoration reaches.

Implementing any of the Project alternatives would result in some less-than-significant adverse impacts, as well as in numerous beneficial effects on jurisdictional wetlands. Most adverse effects to jurisdictional wetlands would be local in scale and temporary, occurring during construction of Project infrastructure. The extensive conservation measures would reduce or minimize potential adverse effects. The beneficial effects of the Project alternatives would be regional and cumulative. For all Project alternatives, it is expected that restoration activities would improve jurisdictional wetlands conditions within and along the river. Control of invasive plant species would enhance the functions and values of jurisdictional wetlands throughout Reach 2B. Over time, native riparian vegetation would mature, prevent invasive exotic species to take hold by shading them out, and continue to contribute to the formation and expansion of high quality jurisdictional wetlands in the area. As a consequence, the overall effect of the implementation of Project alternatives on jurisdictional wetlands would be beneficial, and the Project would not contribute to significant adverse cumulative effects.

In summary, with implementation of the conservation strategy, the Project effects would be beneficial with a range from negligible to substantial benefits for jurisdictional wetlands. There **would not be a cumulatively considerable incremental contribution** to significant adverse effects on jurisdictional wetlands.

25.5.13 Land-Use Planning and Agricultural Resources

In the context of agriculture and land use, applicable plans and projects for the cumulative effects analysis referenced in the PEIS/R and Section 25.2.2 include, but are not limited to:

- Two Gates Fish Protection Demonstration Project.
- Conditional Waiver of Waste Discharge Requirements for Irrigated Lands.
- Comprehensive Conservation Management Plans for National Wildlife Refuges.
- San Joaquin River Parkway Plan.
- Fresno County General Plan.
- Madera County General Plan Policy Document.
- City of Mendota General Plan Update.
- 2030 Firebaugh General Plan.
- Grassland Bypass Project.

Many of the cumulative projects or plans referenced in the PEIS/R would not affect agricultural resources and land use in the Project area based on their lack of proximity relative to the Project. Plans and projects relevant to agricultural and land use in the vicinity of the Project area include the city of Mendota General Plan Update and the 2030 Firebaugh General Plan.

For this analysis, cumulative effects with respect to agriculture and land use are considered in the context of factors that affect agricultural production in the region, including conversion of agricultural land to non-agricultural uses. Agricultural land conversion has been ongoing throughout the region and State to accommodate growth and population expansion into rural areas. The California Department of Conservation (2013) estimates that approximately 8,500 acres of agricultural land was converted to non-agricultural uses in Fresno County between 2008 and 2010; in Madera County, the total was almost 1,100 acres. Agricultural land conversion is driven by development projects and planning processes in rural areas where agricultural production is actively occurring, including county-wide general plans that are intended to guide future growth in both urban and agricultural areas. Other regional issues such as drought, environmental restrictions, and economic recession have also affected agriculture in the region. Recent droughts have reduced the amount of water available for redistribution throughout the state. Many farm operations in the Central Valley faced reduced or eliminated water supplies, which required agricultural land fallowing in many parts of California.

As described in this section, implementation of any of the Project alternatives (i.e., Alternatives A, B, C, or D) would result in significant and unavoidable impacts to agricultural resources in the Project area related to conversion of agricultural land to non-agricultural uses. Based on the information presented above, the Project would have an adverse cumulative effect on agricultural resources when considered in the context of downward trends in agricultural land (i.e., conversion to other uses) and agricultural production in the region. In summary, there **would be cumulatively considerable**

incremental contribution to a significant cumulative impact to agricultural resources under all of the Action Alternatives.

25.5.14 Noise and Vibration

Noise is a localized occurrence and attenuates rapidly with distance. Therefore, only future projects in the immediate vicinity of the Project area would have the potential to add to noise generated by Project activities and result in cumulative noise impacts.

Future construction activities in the Project vicinity that are conducted concurrent with the construction of the Project would temporarily increase noise levels in surrounding areas. Although many of the projects or plans described in the PEIS/R and Section 25.2.2 occur within the Bay-Delta or elsewhere in the Central Valley, proposed development related to the buildout goals of the city of Mendota General Plan may generate types of noise similar to those of the Project and development in the Project area and local vicinity would have the potential to affect nearby sensitive receptors.

Simultaneous construction of these projects would increase noise levels, from onsite construction and transport of materials. The worst case assumption indicates that simultaneous construction could potentially increase source noise emissions by 3 A-weighted decibels (dBA). If construction projects are implemented concurrently, the combined cumulative effects could be above significance thresholds. If this were the case, each project would need to mitigate individual noise effects which would decrease overall cumulative effects. Construction involved with both the Project and any nearby concurrent projects are temporary in nature and Project-related construction activities are anticipated to be conducted during the daytime and during construction noise exempt hours.

Construction noise and stationary-source noise can be controlled on-site at the point of origin; however, traffic noise may extend beyond a project site along existing roadways, resulting in significant traffic noise impacts on sensitive uses along those roadways. A noise increase of up to 16 dBA Community Noise Equivalent Level (CNEL) from construction-related truck traffic is anticipated with the Project, but these activities would occur during construction exempt times.

The primary noise source due to operation of the Project would be generated by the increase in traffic caused by the workers going to and from the Project site for operational and maintenance activities. However, due to the limited number of truck trips, these activities would not cause a noticeable change in traffic noise. Overall, the Project alternatives **would not result in a cumulatively considerable incremental contribution** that would cause a significant cumulative impact on noise.

Under Project Alternatives C and D, pile driving activities would temporarily increase ground-borne vibration levels near an identified sensitive receptor, but Project mitigation measures would reduce potential vibration-related effects to a less-than-significant level. Other future projects would not cause vibration impacts within the immediate vicinity of the Project work site. Therefore, the Project **would not result in a cumulatively**

considerable incremental contribution that would cause a significant cumulative impact on vibration.

25.5.15 Paleontological Resources

The program Restoration Area is underlain by Pleistocene-age sediments of the Modesto and Turlock Lake formations, which are considered paleontologically sensitive rock units. The recovery of vertebrate fossils throughout the Sacramento and San Joaquin valleys in sediments referable to these formations suggests that the potential exists to uncover fossil remains during earthmoving activities of reasonably foreseeable future projects. These projects include those listed in the PEIS/R, and those described in Section 25.2.2 (e.g., build-out of general plans and local projects such as Gill Ranch Gas Storage Project and San Joaquin River Bank Repair Project).

If paleontological finds were to be encountered during Project construction, the potential for cumulative impacts would exist within the context of the overall Restoration Area (where other projects would proceed to construction). Project construction could potentially add to a cumulative impact on paleontological resources. However, mitigation measures would be implemented to salvage such resources within the Project area and reduce potential impacts to a level that is less than significant. The mitigation measure described in Section 18.3.2 (i.e., Mitigation Measure PAL-1) would effectively preserve the value to science of any significant fossils uncovered during Project-related construction.

Fossil discoveries resulting from excavation and earthmoving activities associated with development are occurring with increasing frequency throughout the State. However, unique, scientifically important fossil discoveries are relatively rare, and the likelihood of encountering them is site-specific and is based on the type of specific rock formations found underground, which vary from location to location. Furthermore, when unique, scientifically important fossils are encountered by construction activities, the subsequent opportunities for data collection and study generally provide a benefit to the scientific community. Because of the low probability that any project would encounter unique, scientifically important fossils, development of related projects and other development in the region would not result in a cumulatively considerable impact on paleontological resources. Therefore, the Project alternatives **would not result in a cumulatively considerable incremental contribution** that would cause a significant cumulative impact on paleontological resources.

25.5.16 Public Health and Hazardous Materials

In the context of public health and hazardous materials, applicable plans and projects for the cumulative effects analysis referenced in the PEIS/R and Section 25.2.2 include, but are not limited to, the conveyance of refuge water supply in the South San Joaquin Valley Study Area to the Mendota Wildlife Area, habitat and conservation management plans, transportation development projects, and the Gill Ranch Gas Storage project.

Actions associated with implementation of the Project could result in potentially significant public health effects or safety hazards associated with exposure to hazardous materials and disease vectors prior to implementation of Project mitigation measures.

However, Mitigation Measures HAZ-1 through HAZ-4 would be included to reduce potentially significant impacts of the Project alternatives related to exposure to hazardous materials and disease vectors. Implementation of these mitigation measures would serve to prevent the potential effects of the Project alternatives from contributing in a cumulatively considerable manner with other effects from past, present, or reasonable foreseeable probable future actions. The measures would reduce the contribution of the Project alternatives to these potentially significant cumulative effects. Therefore, the Project alternatives **would not result in a cumulatively considerable incremental contribution** that would cause a significant cumulative impact on public health and hazardous materials.

25.5.17 Recreation

In the context of recreation, applicable plans and projects for the cumulative effects analysis referenced in the PEIS/R include the Two Gates Fish Protection Demonstration Project, Lost Lake Park Master Plan, and San Joaquin River Parkway Plan. Additional plans and projects relevant to regional recreation include the America's Great Outdoors Initiative and the San Joaquin River Blueway. At the local level, the city of Mendota General Plan Update also has implications for recreation near the Project area (referenced in Section 25.2.2).

None of the cumulative projects or plans referenced in the PEIS/R would affect recreation conditions in the Project area based on their location relative to the Project. The Two Gates Fish Protection Demonstration Project is located in the Sacramento-San Joaquin Delta well downstream of Reach 2B. Lost Lake Park is located near the community of Friant in unincorporated Fresno County, and along with the San Joaquin River Parkway Plan, covers recreation uses and activity upstream in Reach 1.

Working in conjunction with one another, America's Outdoor Initiative and the San Joaquin River Blueway would improve recreation opportunities in the Restoration Area. The America's Outdoor Initiative was launched in 2010 and calls for multiple federal agencies, including the Department of Interior, to implement projects that would promote conservation and recreation on public lands. One of the proposed projects under this initiative is the San Joaquin River National Blueway. The San Joaquin River National Blueway is an integrated system of "parks, wildlife refuges, and other publicly accessible places that provides the public an opportunity to explore and enjoy the San Joaquin River from its headwaters to the Delta" (San Joaquin River Partnership 2011). Recreation opportunities offered by the San Joaquin River National Blueway include boating, swimming, picnicking, walking and jogging, cycling, hiking, interpretive trails, wildlife viewing, bird watching, fishing and hunting. The San Joaquin River National Blueway plan identifies Fresno Slough (near the Mendota Wildlife Area) as an existing access site.

The city of Mendota General Plan addresses recreation uses within the city limits, which is located west of the Project Area. The Open Space and Conservation Element of the city of Mendota General Plan documents existing recreation resources in the planning area, including 26 acres of parks and recreation land. In addition, a range of goals, policies, and actions have been developed relative to parks, recreation, and open space, which generally are aimed at protecting recreation resources in an effort to meet the recreation

demand of local residents. Implementation of these goals, policies, and actions would generate recreation benefits to the local area; no adverse effects on recreation resources are expected.

Based on the information presented above, there are no projects or programs that when combined with the less-than-significant recreation impacts anticipated with the Project (as outlined in Section 20.3.3) would result in significant cumulative impacts. In summary, the Project **would not result in a cumulatively considerable incremental contribution** that would cause any cumulative impacts to recreation resources.

25.5.18 Socioeconomics and Economics

In the context of socioeconomics, applicable plans and projects for the cumulative effects analysis referenced in the PEIS/R include the Bay-Delta Conservation Plan and Alternative Delta Conveyance facilities, DMC/California Aqueduct Intertie, DMC Project Recirculation, Two Gates Fish Protection Demonstration Project, Bay Area Water Quality and Supply Reliability Program, and South Bay Aqueduct Improvement and Enlargement Project. Additional plans and projects relevant to regional socioeconomic conditions in the two-county region (referenced in Section 25.2.2) include the Grassland Bypass Project. Many of the cumulative projects or plans referenced in the PEIS/R would not affect socioeconomic conditions in the Project area based on their distance to the Project.

The socioeconomic impact analysis presented in Chapter 21.0, “Socioeconomics and Economics” addresses several types of potential impacts associated with the Project, including changes in agricultural production values and new construction and operations and maintenance expenditures, as well as related effects on the regional economy covering Fresno and Madera counties. Chapter 21.0, “Socioeconomics and Economics” also addresses effects on property tax revenues and changes in population and housing demand. Of these impacts, the cumulative analysis focuses on regional economic effects attributed to the removal of land from agricultural production, which is cumulatively affected by other factors occurring throughout the region.

For the cumulative impact analysis, the Project’s incremental small economic effects have been considered in the context of the regional economic impacts of changes in agricultural production occurring elsewhere in the region. Due to large fluctuations in available agricultural water supplies and declining soil quality elsewhere in the region (and due to urban growth), the number of acres in agricultural production has declined in the Central Valley over the past several years, including land in Fresno and Madera counties. Declines in agricultural production adversely affect regional economic conditions, including losses in jobs and income to local residents. These adverse effects are realized not only in the agricultural sector, including agricultural landowners and farm workers, but also have ripple effects throughout other agriculture-support industries and the overall economy. Declining agricultural production is one contributing factor to unemployment levels in the two-county region.

Implementation of the Project would result in relatively minor economic impacts associated with losses in agricultural production when considered in the context of the

regional economy. The greatest impacts would occur under Alternative D, with total loss of about 103 jobs and $4.3 million in labor income in the two-county region annually. However, when considered in the context of other economic drivers occurring elsewhere in the region, such as declines in agricultural production elsewhere and a stagnant housing market, the Project's incremental economic impacts are cumulatively considerable. Accordingly, the Project's cumulative economic impact is substantial in the short term; however, over the long term, the cumulative impact is moderated by economic growth anticipated as the regional economy recovers from the recent recession. In summary, the Project would result in a **cumulatively considerable incremental contribution** to cumulative impacts to economic conditions in the region under all of the Action Alternatives (i.e., Alternatives A, B, C, and D).

25.5.19 Transportation and Traffic

In the context of transportation and traffic, applicable plans and projects for the cumulative effects analysis referenced in the PEIS/R and Section 25.2.2 include transportation and development projects such as SR 33 Intersection Improvements, SR 180 Westside Expressway Route Adoption Study, and proposed development related to the build-out goals of the city and county General Plans.

In consultation with Fresno Council of Governments (COG) and coordination with County of Madera Planning staff, the latest approved version of the Fresno COG transportation model was used to develop 2035 baseline conditions (which were subsequently used to develop the No Action Alternative). The 2035 baseline condition traffic growth projections captured all reasonably probable future actions of regional significance within the Restoration Area and thus the traffic impact analysis conducted for the Project alternatives is conservative and reflects worst case cumulative impact conditions. Potential local unnamed future cumulative projects are also assumed to be captured in the ambient traffic growth of 1 percent per year derived from the Fresno COG' transportation model. Within the Restoration Area, there is a potential for concurrent construction activities, however potential individual site impacts would be dispersed due to timing, location and distance. The Project is not anticipated to cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the roadway system. Therefore, implementation of Project alternatives would not provide a cumulatively considerable incremental contribution to traffic load.

However, the Project would result in a temporary or permanent road closure at river crossings that may affect emergency access or emergency response times for fire units and emergency responders providing mutual assistance to areas just north the river. This potential effect remains significant, even after implementation of mitigation measures. Therefore, all Action Alternatives **would result in one potentially significant and unavoidable cumulative impact** to transportation and traffic, effects to emergency access.

25.5.20 Utilities and Service Systems

For public utility and service systems, applicable plans and projects for the cumulative effects analysis include:

- Fresno County General Plan.
- Madera County General Plan Policy Document.
- City of Fresno General Plan.
- Gill Ranch Gas Storage Project.
- Kerman Walmart Project.

The Gill Ranch Storage Project is located approximately 8 miles northeast of Mendota Pool. The Kerman Walmart project is located 17 miles east of Mendota Pool. Past, present, and reasonably foreseeable projects must be consistent with specific goals, objectives, policies, and implementation measures of their respective county's general plan. Each of the past, present and reasonably foreseeable projects, and planned development generally, is required to evaluate whether sufficient public services and utilities would be available and mitigate for significant effects where necessary.

As discussed in Chapter 23.0, "Utilities and Service Systems," the Project would not increase demand for utility and service systems, such as fire protection, police protection, emergency, schools, parks, libraries, water supply, wastewater and solid waste services. However, fire and emergency response times to private property immediately north of the river would be permanently increased due to the proposed closure of San Mateo Avenue under Alternative D, and this would be a potentially significant, unavoidable impact.

None of the past, present, and reasonably foreseeable projects or plans referenced in the PEIS/R would contribute to the demand for public utilities and services in the Project area based on their location relative to the Project. Furthermore, the Project does not have growth inducing effects.

Based on the information presented above, there are no projects or programs that when combined with utilities and services impacts anticipated with the Project (as outlined in Section 23.3.3) would result in significant cumulative impacts. In summary, the Project **would not result in a cumulatively considerable incremental contribution** that would cause cumulative impacts to utilities and service systems.

25.5.21 Visual Resources

In the context of aesthetics/visual resources, applicable plans and projects for the cumulative effects analysis referenced in the PEIS/R and Section 25.2.2 include several large projects in various stages of planning and implementation. Those projects include the DMC Recirculation Project, the city of Stockton Delta Water Supply Project, implementation of the Corps' policy on levee vegetation, and various proposed residential, commercial, and industrial developments. Several large projects in various stages of planning and implementation may have adverse impacts on visual resources. Conversely, several projects in the planning stages within the Project area and vicinity could have a beneficial effect on visual resources.

Development is increasingly changing the visual character of the Project vicinity from vast areas of open space to urban uses, thus altering and limiting the views available to recreationists and residents living in the area. This trend will continue as reasonably foreseeable probable future projects are implemented in the Project vicinity. Substantial changes in visual conditions will continue as agricultural lands and open space are replaced by urban and industrial development and infrastructure projects, and as vegetation is removed to make room for future development.

The cumulative effect of these changes on visual resources from past, present, and reasonably foreseeable planned future projects would be significant. These cumulative impacts can be minimized to a degree through vegetative and topographic screening of structures, use of outdoor lighting that limits glare, appropriate building design, and other measures such as restoration of disturbed areas; however, in many cases, the significant cumulative impact cannot be mitigated to a less-than-significant level. Therefore, the cumulative change of agricultural and open-space views in the Project vicinity to urban landscape and the associated increase in nighttime light and glare and subsequent skyglow would be significant (without consideration of any incremental change due to the Project).

The release of Restoration Flows under the Project alternatives would provide a net beneficial effect on visual resources by improving habitat along the San Joaquin River. Less-than-significant Project impacts would occur due to construction of new infrastructure. Potentially significant Project impacts could occur due to construction related effects; however, mitigation measures would be implemented to reduce adverse visual effects to less than significant levels. Overall, the Project alternatives **would not result a cumulatively considerable incremental contribution** to the significant cumulative impact on visual resources from the past, present, and foreseeable projects and trends.

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26.0 Other NEPA and CEQA Considerations

In addition to the factors described in the preceding chapters, the California Environmental Quality Act (CEQA) requires consideration of significant and unavoidable impacts, National Environmental Policy Act (NEPA) requires consideration of the relationship of short-term uses and long-term productivity, and both NEPA and CEQA require consideration of irreversible and irretrievable commitments of resources as well as growth-inducing impacts. These considerations are described below.

26.1 Significant and Unavoidable Impacts

Section 21100, subdivision (b)(2)(A) of CEQA provides that an Environmental Impact Report (EIR) shall include a detailed statement setting forth "any significant effect on the environment that cannot be avoided if the project is implemented." Chapters 4.0 through 24.0 provide a detailed analysis of all potentially significant environmental impacts of implementing the Project, list feasible mitigation measures that could reduce or avoid the significant impacts of the Project alternatives, and specify whether these mitigation measures would reduce these impacts to a less-than-significant level. If a specific impact cannot be reduced to a less-than-significant level, it is considered a significant and unavoidable impact. As shown in Table 26-1, implementing the Project would have several significant and unavoidable environmental impacts.

Table 26-1.
Summary of Significant and Unavoidable Impacts

Impacts	Alternative	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Air Quality				
AQ-3: Expose Sensitive Receptors to Substantial Air Pollutants Associated with Construction	No-Action	No Impact	--	No Impact
	A	S	AQ-3A: Reduce Diesel Particulate Matter Emissions from Construction Equipment AQ-3B: Reduce Diesel Particulate Matter Emissions from Material Hauling Vehicles	SU
	B	S		SU
	C	S		SU
	D	S		SU

Table 26-1.
Summary of Significant and Unavoidable Impacts

Impacts	Alternative	Level of Significance before Mitigation	Mitigation Measures	Level of Significance after Mitigation
Land Use Planning and Agricultural Resources				
LU-1: Removal of Land from Agricultural Production	No-Action	No Impact	--	No Impact
	A	S	LU-1: Preserve Agricultural Productivity od Designated Farmland to the Extent Possible	SU
	B	S		SU
	C	S		SU
	D	S		SU
LU-2: Conversion of Designated Farmland to Non-Agricultural Uses	No-Action	No Impact	--	No Impact
	A	S	LU-2: Preserve Agricultural Productivity od Designated Farmland to the Extent Possible	SU
	B	S		SU
	C	S		SU
	D	S		SU
LU-3: Conflict with Williamson Act Contracts	No-Action	No Impact	--	No Impact
	A	S	LU-3: Preserve Agricultural Productivity od Designated Farmland to the Extent Possible	SU
	B	S		SU
	C	S		SU
	D	S		SU
Transportation and Traffic				
TRA-4. Potential to Result in Inadequate Emergency Access	No-Action	No Impact	--	No Impact
	A	PS	TRA-4A: Provide Temporary Roadway and Crossing at San Mateo Avenue	SU
	B	PS	TRA-4B: Use Construction Sequencing to Provide Continuous Emergency Access at Drive 10 ½	SU
	C	PS	TRA-4A: Provide Temporary Roadway and Crossing at San Mateo Avenue	SU
	D	PSU	--	PSU

Key:
LTS = less than significant
PS = potentially significant
PSU = potentially significant and unavoidable
S = significant
SU = significant and unavoidable

Where feasible mitigation exists, it has been included to reduce these impacts; however, the mitigation would not be sufficient to reduce these impacts to a less-than-significant level. Chapter 25.0, "Cumulative Effects," describes the contribution of the Project to effects caused, or would be caused, by past, present, and reasonably foreseeable future actions.

26.1.1 Construction-Related Air Pollutants

Diesel fueled equipment emits the toxic air contaminant diesel particulate matter. Project construction emissions were estimated for off-road construction equipment and material hauling vehicles which are diesel fueled, and an exposure assessment and health risk assessment was conducted for sensitive receptors in the Project area. Sensitive receptors were found to have a significant increase in cancer risk for both a resident child and school child exposure scenarios. Mitigation measures would be implemented to reduce diesel particulate matter emissions from construction equipment and material hauling vehicles. All off-road construction diesel equipment and material-hauling diesel equipment would use the cleanest reasonably available equipment or consider alternative fueled equipment or addition of after-market control devices (e.g., diesel particulate filters). Material hauling trips would also be consolidated into the fewest trips possible. If these mitigation measures reduce emissions by 85 percent, which is the maximum estimated reduction when diesel particulate filters are used by all equipment and trucks, the excess cancer risk for the resident child would still be above target values. This is due to the size of the construction Project and the close proximity of the receptor to the roadway.

26.1.2 Agricultural Resources

Project actions would remove substantial amount of agricultural lands from production, including Prime Farmland, Farmland of Statewide Importance, and Unique Farmland, and potentially conflict with Williamson Act contracts. Mitigation measures would require the Project proponents to recognize and minimize adverse effects on agricultural lands to the extent practicable. Measures include selection of borrow areas to minimize fragmentation of agricultural lands; locating construction laydown and staging areas on sites that are fallow, disturbed, or to be discontinued for use as agricultural land to the extent possible, and using existing roads to access construction areas to the extent possible; stockpiling of topsoil in designated farmland areas to be used in subsequent habitat restoration, restoration of agricultural uses, or redistributed for agricultural purposes; coordinate with landowners and agricultural operators to minimize construction-related impairment of agricultural productivity; and providing access to potential agricultural areas on the floodplain. The Project proponent would also acquire agricultural conservation easements to be held by land trusts or public agencies or provide funds to a land trust or government program that conserves agricultural lands. However, implementation of these measures would not avoid the conversion of agricultural land to non-agricultural uses or fully mitigate the loss of farmland and the residual effect is significant and unavoidable.

26.1.3 Emergency Response Times

Project construction activities would create temporary or permanent roadway closures that may affect emergency access/emergency response times to areas immediately north of the San Mateo Avenue crossing or near Drive 10 ½. For those alternatives that improve the San Mateo Avenue crossing, mitigation measures would require a temporary roadway and crossing to allow for thru-traffic and access across levee, canal, and river crossing construction areas, as applicable. The mitigation measure for Alternative B requires construction sequencing to provide continuous emergency access at Drive 10 ½. In both cases, local emergency dispatchers will be notified of temporary road closures.

No feasible mitigation exists for long-term impacts to emergency response times near areas with permanent roadway closures.

26.2 Relationship between Short-Term Uses and Long-Term Productivity

NEPA requires that an Environmental Impact Statement (EIS) consider "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 Code of Federal Regulations [CFR] 1502.16). Such consideration involves using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, create and maintain conditions under which humans and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

Construction activities would include short-term uses of capital, labor, fuels, and construction materials, as well as habitats, agricultural areas, and recreation areas. General commitments of construction materials are largely irreversible because most of the construction materials are unsalvageable (see Section 26.3, "Irreversible and Irretrievable Commitments of Resources"). Construction would also result in short-term construction-related effects such as interference with local traffic and circulation and increased air emissions, ambient noise levels, dust generation, and disturbance of wildlife. These effects would be temporary, occurring only during construction, and are not expected to alter the long-term productivity of the natural environment.

In the short term, implementing the Project would directly increase demand for construction and technical services. The additional economic activity in these sectors could create jobs for construction contractors and workers, consulting engineers and designers, environmental consultants, such as biologists, botanists, and ecologists, and other personnel. It also would indirectly increase economic activity in industries that provide construction materials and industries providing goods and services to construction workers. In turn, the demand for these services could result in new jobs. Conversely, agricultural production would be reduced in the short term as a result of the loss and conversion of currently productive farm and rangeland to restoration uses. The reduction of productive agricultural land would result in fewer jobs in the agricultural sector. The effects of Project implementation on employment and economic activity are discussed in Chapter 21.0, "Socioeconomics and Economics."

Long-term productivity resulting from implementing the Project would increase in some cases and would decrease or remain unchanged in others. The short-term increase in construction-related economic activity would not be sustained over the long term. Implementation of the Project would also permanently remove lands adjacent to the river from agricultural production.

Within the Project area, Project implementation would result in other long-term effects, such as increased riparian habitat, increased recreational opportunities and use of existing

facilities, and improved visual experience both for recreationists and adjacent landowners. No identified adverse effects would pose a long-term risk to human health and safety.

In summary, the short-term uses would generate regional economic activity that would decrease over the long term as construction activities are completed. The benefits of aquatic and riparian habitat restoration, self-sustaining salmon populations, and increased recreational opportunities are substantial and would continue into the long term. Implementing the Project, including implementation of mitigation as described in this Environmental Impact Statement/Report (EIS/R), would foster and promote the general welfare, create and maintain conditions under which people and nature can exist in productive harmony, and fulfill social, economic, and other requirements of present and future generations.

26.3 Irreversible and Irretrievable Commitments of Resources

NEPA requires that an EIS include a discussion of the irreversible and irretrievable commitments of resources that may be involved should an action be implemented. Similarly, the State CEQA Guidelines (§ 15126, subd. (c)) require that an EIR include a discussion of the significant irreversible environmental changes that would be caused by a proposed project should it be implemented.

An irreversible and irretrievable commitment of resources is the permanent loss of resources for future or alternative purposes. Irreversible and irretrievable resources are those that cannot be recovered or recycled, or those that are consumed or reduced to unrecoverable forms. The proposed action would result in the irreversible and irretrievable commitment of the following:

- Construction materials.
- Nonrenewable energy.
- Land area and associated agricultural resources committed to restoration use.

Project activities under all Project alternatives would commit material resources to the construction of new facilities. Under all Project alternatives, construction materials would be committed to a variety of actions that would construct or modify existing facilities. With the exception of fill material, the San Joaquin River Restoration Program (SJRRP) would commit only a small quantity of these material resources relative to projected residential, commercial, industrial, and institutional development. Therefore, the commitment of these material resources would not result in a permanent loss of this resource for the future or alternative purposes.

A substantial amount of material resources committed as a result of the Project alternatives would be fill material (soil, and to a much lesser extent, rock aggregate) primarily for earthen levee construction. The Fresno area is projected to have less than 10

years of permitted aggregate resources remaining, based on projected population growth (Kohler 2006). The SJRRP is not accounted for in that 10-year estimate of demand for aggregate resources. Therefore, if aggregate material is obtained from commercially available sources, the commitment of this aggregate material to actions could result in a permanent loss of this resource for the future or alternative purposes, such as for private development. However, if aggregate material is not obtained from existing commercial sources, that is, if this fill material is obtained from private or public lands, the SJRRP would not commit aggregate resources that would deprive other purposes.

Implementing Project actions would commit nonrenewable energy in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles that would be needed for the construction, operation, and maintenance of actions. However, these commitments of nonrenewable energy resources used for implementing the Project are not expected to adversely affect other activities that require electricity, gasoline, diesel fuel, and oil.

The SJRRP would commit land to implementing the Project. Farm and rangeland (including designated Farmland) would be converted to nonagricultural uses (e.g., levee and bypass footprints, floodplain habitat). This conversion would be long-term but not necessarily irreversible or irretrievable.

26.4 Growth-Inducing Impacts

NEPA requires that an EIS consider indirect effects of a project, which are often the result of growth inducement. The State CEQA Guidelines require that an EIR discuss how a project may induce growth (Cal. Code Regs., , tit. 14, §15126.2, subd. (d)). A project will have a growth-inducing impact if it directly or indirectly:

- Removes obstacles to population or economic growth.
- Requires the construction of additional community service facilities that could cause significant environmental effects.
- Encourages and facilitates other activities that would significantly affect the environment, either individually or cumulatively.

In *Napa Citizens for Honest Government v. Napa County Board of Supervisors* (2001) 91 Cal. App. 4th 342, 367–371 (110 Cal. Rptr. 2d 579), the California Court of Appeal, Fourth District, provided clear direction on the standards for disclosing growth-inducing effects. The EIR must describe the directness or indirectness of the effect. It must also describe the ability of the lead agency to forecast actual effects. Based on these factors, the lead agency may consider mitigation measures for the anticipated effects. Growth-inducing effects are evaluated for the alternatives in accordance with the California Court of Appeal's finding in *Napa Citizens for Honest Government v. Napa County Board of Supervisors* (2001):

> *Neither CEQA itself, nor the cases that have interpreted it, require an EIR to anticipate and mitigate the effects of a particular project on growth on other areas. In circumstances such as these, it is sufficient that the Final Environmental Impact Report warns interested persons and governing bodies of the probability that additional housing will be needed so that they can take steps to prepare for or address that probability. The Final Environmental Impact Report need not forecast the impact that the housing will have on as yet unidentified areas and propose measures to mitigate that impact. That process is best reserved until such time as a particular housing project is proposed.*

None of the Project alternatives removes an obstacle to population or economic growth. No utility (i.e., domestic water, wastewater treatment, sewer, or stormwater treatment) expansion is proposed under any of the alternatives. No new, additional transportation facilities are proposed, nor is there any proposal to increase the capacity of existing facilities. In summary, implementing the Project would not induce growth because the construction workforce would partially come from other areas and is expected to increase demand only for temporary housing, such as hotels, motels and apartments, and increased economic activity resulting from added recreation opportunities would not be of a magnitude that would drive demand for new housing. Because service systems would not be constructed or expanded, none of the alternatives would remove an impediment to growth.

Project actions would not remove obstacles to growth or require construction of additional community service facilities that could cause significant environmental effects. Project actions would result in recreation opportunities that would not exist under the No-Action Alternative. However, recreation opportunities would not be at a level that would encourage or facilitate other activities that would significantly affect the environment, either individually or cumulatively. Chapter 20.0, “Recreation,” describes existing recreation opportunities in the Project area and estimates opportunities under the No-Action condition. Chapter 20.0 “Recreation,” further describes how an increase in recreational activity, particularly in fishing, boating, and nature watching, could occur in the Project area. There would be insufficient economic activity to increase demand for development above that anticipated by local land-use planning agencies.

26.5 Preferred Alternative

A meeting was held on January 29, 2013, in order to introduce the consensus-based alternative concept and approach to the adjacent landowners, canal companies, irrigation districts, levee districts, cities, and the Settling Parties. The consensus-based alternative approach gave these entities the opportunity to provide input on the Project course of action, and their input was considered during the identification of the preferred alternative. Following several meetings with the individuals and groups listed above, U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and California State Lands Commission (CSLC) identified a preferred alternative, Alternative B, based on the input received on the Action Alternatives. The preferred alternative is prelimilary, and a

final alternative will not be selected for implementation until consideration of comments received on the public draft EIS/R.

Consistent with Council on Environmental Quality (CEQ) Guidelines for NEPA, 40 CFR Part 46.425, and State CEQA Guidelines, the Final EIS/R will identify a preferred alternative for implementation.The alternative selected for implementation will be articulated in the Record of Decision, which will be completed no less than 30 days following the release of the final EIS/R, and in the findings and other documents to complete the CEQA process.

26.6 Environmentally Preferable/Superior Alternative

CEQ Regulations require identification of an environmentally preferable alternative, and the State CEQA Guidelines require identification of an environmentally superior alternative. However, the CEQ Guidelines and CEQA Guidelines do not require adoption of the environmentally preferable/superior alternative as the preferred alternative for implementation. The selection of the preferred alternative is independent of the identification of the environmentally preferable/superior alternative, although the identification of both is based on the information presented in this EIS/R.

Section 1505.2(b) of the CEQ Regulations requires the NEPA lead agency to identify the environmentally preferable alternative in a Record of Decision. The CEQ Regulations define the environmentally preferable alternative as "…the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources."

Similar to the environmentally preferable alternative under NEPA, the State CEQA Guidelines, sections 15120 and 15126.6, subdivision (e)(2), require identification of an environmentally superior alternative. If the environmentally superior alternative is the "no project" alternative, the State CEQA Guidelines, section 15126.6, subdivision (e)(2), require identification of an environmentally superior alternative among the action alternatives.

To identify the environmentally preferable/superior alternative, each of the Project alternatives is evaluated based on significance thresholds and the potential adverse impacts identified. The relative potential for each action alternative to benefit the resource areas is also identified. The action alternative(s) with the fewest adverse impacts and greatest benefits (where applicable) is identified for each resource category, as summarized below.

All of the Project alternatives would achieve implementation of Project goals. The alternatives contribute to the success of these goals to varying extents. Under all action alternatives, construction and long-term operations and maintenance impacts would occur related to air quality, biological resources – fisheries, biological – vegetation, biological –

wildlife, climate change and greenhouse gases, cultural resources, environmental justice, geology and soils, hydrology – flood management, hydrology – groundwater, hydrology – surface water resources and water quality, land-use planning and agricultural resources, noise and vibration, paleontological resources, public health and hazardous materials, recreation, socioeconomics and economics, transportation and traffic, utilities and service systems, and visual resources, compared to the No-Action Alternative or existing conditions, as described in Chapters 4.0 through 24.0.

Alternative B is the environmentally preferable/superior alternative. All four Action Alternatives have the same significant and unavoidable impacts for air quality and land use. All four Action Alternatives have the same potentially significant and unavoidable impacts for reduced emergency access. The only differences between the alternatives are for less than significant impacts. Alternative A and Alternative B have less than significant impacts related to visual impacts at Bass Avenue and water quality impacts of agriculture on the floodplain. Alternative C has less than significant impacts related to water quality from Mendota Dam modifications and visual impacts to both Mendota Pool Park and the area around Mendota Dam. Alternative D has less than significant impacts related to water quality impacts of agriculture on the floodplain, water quality impacts due to Mendota Dam modifications, and visual impacts to both Mendota Pool Park and the area around Mendota Dam. Alternative D has the widest levee alignment, but also most environmental impacts due to its greater number of less than significant impacts. Alternative A and B have the least environmental impacts, and the same ones. Alternative B includes a wider floodplain levee alignment than Alternative A, improving Project benefits to the fishery and environment. The Alternative B levee alignments have been negotiated with landowners to minimize agricultural impacts while helping to meet fisheries goals. Agriculture on the floodplain allows for flexibility for floodplain management and minimizes the amount of agricultural land taken out of production. This minimizes but does not eliminate the significant and unavoidable impacts to land use. Agriculture in the floodplain adds less than significant impacts to water quality as a result of pesticide runoff. The preferred alternative balances the needs of the Chinook salmon fishery with local farming concerns.

26.7 Least Environmentally Damaging Practicable Alternative

The SJRRP is working closely with Federal, State, and regional agencies to meet regulatory requirements and to avoid and minimize impacts and, where necessary, to reach agreement on mitigation measures for impacts that cannot be avoided. One important process that integrates many of the applicable regulatory requirements is the Section 404(b)(1) process, as managed by the United States Army Corps of Engineers (Corps) with oversight from the U.S. Environmental Protection Agency (EPA). The 404(b)(1) process considers if the range of potential alternatives evaluated in the EIS/R is an appropriate range of “reasonable” and “practicable” alternatives using the best available information. The Corps then determines the Least Environmentally Damaging Practicable Alternative (LEDPA) to meet requirements of NEPA, Sections 401 and 404

of the Clean Water Act, and Section 14 of the Rivers and Harbor Act, with consideration of compliance with the Federal Endangered Species Act and the National Historic Preservation Act. The Corps' 404(b)(1) LEDPA determination is expected to be attached to the final EIS/R.

26.8 Comparison of Action Alternatives

Table 26-2 provides a comparison of some of the features of the Action Alternatives. Table 26-3 summarizes some of the conditions that were used to evaluate impacts and benefits of the Action Alternatives. These features are discussed below by resource area in order to compare impacts and benefits among the Action Alternatives.

26.8.1 Air Quality

Action Alternatives would result in significant and unavoidable impacts to sensitive receptors due to temporary and short-term construction-related emissions of the toxic air contaminant diesel particulate matter. Alternatives A and B would impact sensitive receptors (i.e., resident child and school child) to a greater degree than Alternatives C and D. Alternative B would cause the greatest impact to the potential resident child, while Alternative A would have the greatest impact to the school child (see Table 26-3).

All of the Project alternatives would have construction-related impacts associated with nitrogen oxides and reactive organic gas and long-term reductions in agricultural emissions. Without implementation of mitigation measures, Project alternatives could create significant amounts of construction-related criteria air pollutants and conflict with an applicable plans or policies related to air quality. Alternative A would have the most adverse impacts from construction emissions because it requires the most construction activity (i.e., activity associated with offroad construction equipment, material hauling vehicles, worker commute vehicles, and fugitive dust emissions). Conversely, Alternative C would have the least adverse impacts because it requires the least construction activity. Overall, Alternative C would provide the least adverse impact to air quality (Table 26-3).

26.8.2 Biological Resources – Fisheries

Action Alternatives provide benefits to fisheries, such as fish passage through Reach 2B and increased floodplain area for primary production (i.e., food) or rearing habitat. Alternative D provides the greatest benefits for primary production, Alternative B provides the greatest benefits for rearing habitat, and Alternative D provides the most advantageous fish passage conditions (e.g., the fewest structures and jumps) (Table 26-3).

Adverse impacts to fisheries include effects from in-channel construction activities and effects from agricultural activities on the floodplain. All Action Alternatives would include in-channel construction activities. Alternatives A, B, and D would allow agricultural activities on the floodplain after construction is complete which could impact fishery resources while Alternative C would not allow these activities.

Table 26-2.
Levees, Land Acquisition, and Construction Duration

Category	Unit of Measure	Alternative A	Alternative B	Alternative C	Alternative D
Left Levee Length	miles	8.7	8.1	7.7	7.2
Left Average Levee Height	feet	5.8	5.6	5.6	5.2
Left Fill Volume	cubic yards	345,200	328,600	317,500	272,000
Right Levee Length	miles	7.1	6.8	6.9	6.6
Right Average Levee Height	feet	5.4	4.7	5.2	4.2
Right Fill Volume	cubic yards	269,700	226,900	224,500	188,250
Land Acquisition[1]	acres	2,700	2,900	2,450	3,300
Time to Build[2]	months	132	157	157	158

[1] Land acquisition total includes areas that may be State of California sovereign lands or public trust lands.

[2] Construction timeline does not include the time that would also be needed to obtain permits, appraise and acquire land, and perform pre-construction surveys.

Table 26-3.
Features and Conditions of the Action Alternatives

Resource Area	Category	Criteria	Unit of Measure	Alternative A	Alternative B	Alternative C	Alternative D
Air Quality	Construction Emissions	Average Annual Construction Emissions for NOx	tons per year	299	281	208	217
		Average Annual Construction Emissions for ROG	tons per year	19	18	13	14
	Sensitive Receptors	Increased Cancer Risk for the Resident Child	in a million	77	78	62	71
		Increased Cancer Risk for the School Child	in a million	60	55	37	38
Fisheries	Floodplain characteristics	Primary production (<1.0 feet inundation at 2,500 cfs)	acres	470	440	520	740
		Rearing habitat (>1.0 feet inundation at 2,500 cfs)	acres	380	560	230	310

Table 26-3.
Features and Conditions of the Action Alternatives

Resource Area	Category	Criteria	Unit of Measure	Alternative A	Alternative B	Alternative C	Alternative D
Fisheries	Fish passage conditions	Maximum number of steps at structures	number of jumps	43	54	59	36
		Potential predation sites	number of artificial structures	21	9	7	7
Vegetation	Sensitive natural vegetation communities	Construction impacts - Infrastructure	acres	44	31	37	47
		Construction impacts - Floodplain	acres	270	300	305	299
		Habitat restoration estimates	acres	≤1,420	≤1,970	≤1,450	≤2,000
Wildlife	Special-species wildlife habitat impacts	Giant garter snake	acres	460	429	519	523
		Swainson's hawk	acres	1,340	1,267	1,252	1,431
	Restoration estimates	Special-status species habitat extent	acres	≤1,070	≤1,640	≤1,050	≤1,630
		Wildlife habitat	acres	≤1,330	≤1,870	≤1,360	≤1,900
Greenhouse Gas	Construction emission	Average CO_{2e} emissions	metric tons per year	47,817	45,080	33,066	34,580
Cultural Resources	Potential impacts	Impacts to historical properties	number of listed properties	0	0	1	1
Groundwater	Shallow groundwater	Groundwater <5 feet	acres	320	360	330	330
		Groundwater 5-7 feet	acres	60	80	70	70
Wetlands	Potential impacts	Riparian, wet meadows, marshes, and other waters of the United States (excluding potential borrow areas)	acres	656	582	746	762
	Restoration estimates	Wetlands and other waters with hydric soils (excluding potential borrow areas)	acres	≤720	≤840	≤760	≤880
Land Use	Permanent loss of designated Farmland	Future infrastructure/floodplain habitat	acres	1,000	786	1,218	1,143
		Other floodplain areas	acres	≤480	≤786	0	≤862
		Borrow areas	acres	≤350	≤350	≤350	≤350

Table 26-3.
Features and Conditions of the Action Alternatives

Resource Area	Category	Criteria	Unit of Measure	Alternative A	Alternative B	Alternative C	Alternative D
Noise and Vibration	Potential impacts	Maximum change in community noise equivalent levels from construction traffic	dBA	16	16	15	15
Socioeconomics and Economics	Economic effects	Agricultural production annual values	millions	-$6.6	-$7.6	-$6.0	-$9.1
		Agricultural employment	number	-75	-85	-67	-103
		Construction output	millions	$68	$52	$65	$55
		Construction employment	number	293	244	287	258
Transportation and Traffic	Potential impacts	Maximum increase in traffic on Project roadway segments	ADT	6,036	5,688	4,383	4,377
Utilities and Service Systems	Relocations	Electrical Distribution	feet	43,500	48,500	48,000	68,000
		Gas Transmission	feet	10,000	11,000	9,000	11,500
		Water Pipeline	feet	31,000	41,000	33,000	50,000
		Canal	feet	32,500	31,500	32,500	56,000
		Culvert	number	1	1	1	1
		Diversion	number	3	3	3	3
		Barn/Shed	number	1	1	1	1
		Facility	number	1	1	1	1
		Groundwater Well	number	26	32	25	32
		Lift Pump	number	10	10	10	10
		Power Pole	number	144	162	166	239
		Dwelling	number	2	2	2	2

ADT = average daily traffic
dBA = A-weighted decibel(s)
CO2e = carbon dioxide equivalents

26.8.3 Biological Resources – Vegetation

Action Alternatives would impact riparian habitat and other special-status vegetation alliances during construction of the Project and facilitate the increase in distribution and abundance of invasive plant species in the Project area. Alternatives C and D would impact more acreage of special-status vegetation alliances than Alternatives A and B (Table 26-3). However, conservation measures would be implemented that would offset potential adverse effects on special-status vegetation alliances and control the spread and introduction of invasive plants.

Project alternatives would provide benefits to riparian habitat and other sensitive vegetation resources and would enhance opportunities to implement conservation strategies and attain conservation goals for sensitive vegetation. Alternative B provides a wide, consensus-based floodplain with a mixture of active and passive riparian and floodplain habitat restoration and compatible agricultural activities. Alternative D also provides a wide floodplain which could provide substantial restoration opportunities (Table 26-3) but has passive restoration. The other alternatives provide a narrow floodplain and/or passive riparian habitat restoration and farming in the floodplain. Overall, Alternative B could provide the greatest benefits and least adverse impacts to vegetation.

26.8.4 Biological Resources – Wildlife

Action Alternatives would impact habitat used by special-status wildlife species. Alternative B could have the most adverse impacts to wildlife because this alternative would have the most potential impact to special-status wildlife species habitat prior to implementation of Project conservation measures. However, conservation measures would be implemented to avoid and minimize adverse impacts to special-status species and therefore estimates for habitat impacts are conservative for the Action Alternatives.

Alternatives B and D would potentially impact species habitat with Project infrastructure to a greater extent than Alternative A and C. Alternative B would also have the greatest potential for impacting species habitat on the floodplain which would later be restored. Alternative A would, on average, have the least impact from Project infrastructure and temporary construction areas (but possibly the largest impact from borrow areas). However, Alternative A would have the most elderberry shrubs removed to accommodate Project infrastructure. Alternative C would have the least impact on species habitat considering all potential long-term and short-term habitat impacts.

Project alternatives would include long-term benefits to wildlife associated with enhanced riparian and floodplain vegetation within Reach 2B. Alternative C provides active riparian and floodplain habitat restoration and Alternative B provides a mixture of active and passive riparian and floodplain restoration and compatible agricultural activities, while Alternatives A and D provide passive riparian habitat restoration and agricultural practices in the floodplain. Alternative B could provide the greatest benefits associated with habitat restoration (Table 26-3).

Project alternatives would cause temporary and intermittent impacts on wildlife movement corridors as a result of Project construction. However, post-project conditions would most likely improve habitat for migrating species, particularly for Alternatives B and C which provide active habitat restoration or a mixture of active and passive habitat restoration.

26.8.5 Climate Change and Greenhouse Gas Emissions

Action Alternatives could create significant amounts of construction-related greenhouse gas (GHG) emissions without implementation of mitigation measures. Alternative A would have the most adverse impacts to climate change because it requires the most construction activity (i.e., activity associated with offroad construction equipment, material hauling vehicles, and worker commute vehicles). Conversely, Alternative C would have the least adverse impacts to climate change because it requires the least construction activity (see Table 26-3). Project operation-related GHG emissions would be similar for the Action Alternatives.

Project alternatives would provide benefits to climate change by increasing riparian and floodplain habitat, which has the capacity to absorb some GHGs. Over the long term, increased wetland and riparian zones would likely result in a decrease in GHG emissions relative to managed agriculture. Alternatives B and D would provide more floodplain habitat and potentially more carbon sequestration than Alternatives A and C.

26.8.6 Cultural Resources

Action Alternatives could impact archaeological resources if encountered during ground disturbing construction activities, particularly if borrow areas are located near identified archaeological resources, such as CA-FRA-45 and CA-FRA-106. Project mitigation measures would be implemented under all of the Action Alternatives to reduce potential impacts to archaeological resources.

Potential adverse effects to historical properties could occur through substantial alterations or changes to the historical setting. Of particular concern are properties listed or eligible for listing in the National or California Register. Alternatives C and D include changes to Mendota Dam and the outlet of the Delta-Mendota Canal, both of which are listed in the National and/or California Register, while Alternatives A and B do not modify these historical properties.

26.8.7 Environmental Justice

Project alternatives could have disproportionately high and adverse effects on environmental justice communities of concern (i.e., disadvantaged populations) as a result of removal of land from agricultural production, conversion of designated farmland to nonagricultural uses, cancellation of Williamson Act contracts, and the resultant changes in agricultural jobs and the regional economy. Alternative D would have the most adverse effects to farm-level jobs and the regional agriculturally influenced economy. Alternative C would have the least adverse effect to farm-level jobs and regional economy (see Table 26-3).

Project alternatives also have the potential for disproportionately high and adverse effects on environmental justice communities of concern as a result of construction-related emissions of criteria air pollutants and precursors and exposure of sensitive receptors to substantial concentrations of toxic air contaminants. Alternatives A and B would impact sensitive receptors to a greater degree than Alternatives C and D. Alternative A would have the most adverse impacts from construction emissions and Alternative C would have the least adverse impacts (see Table 26-3).

26.8.8 Geology and Soils

Action Alternatives would have similar impacts to geology and soils. Impacts from borrow areas would be similar for all of the Action Alternatives (up to 350 acres of land would be needed for borrow areas under any alternative). Erosion effects could occur, but standard erosion protection measures would be implemented under each alternative. Adverse soil conditions may also occur, but again, the Project would implement appropriate design measures under all Project alternatives.

26.8.9 Hydrology – Flood Management

Action Alternatives would have similar impacts and benefits to flood management. Project alternatives would impact flood management by temporarily limiting access to levees and facilities for maintenance and inspection staff. Diversion structures and fish passage facilities could also create localized backwater and redirection effects, though levee heights would be designed to accommodate such effects. Project alternatives would provide flood management benefits by increasing flood conveyance capacity in Reach 2B.

26.8.10 Hydrology – Groundwater

Project alternatives would have similar impacts to groundwater. Construction associated with channel and structural improvements could lead to changes in groundwater quality, however, mitigation measures would be implemented to reduce or avoid impacts.

Project alternatives could cause increased groundwater levels in areas outside of the floodplain levees. Alternative B may cause more areas to have shallow groundwater than the other alternatives (i.e., depth to groundwater less than 5 feet) (Table 26-3). However seepage management measures would be implemented during Project design and operations and would be included, as necessary, in Project areas where under-seepage is likely to affect adjacent land uses. Seepage control measures could include slurry walls, seepage wells, seepage berms, land acquisition (fee title or seepage easements), and other measures.

26.8.11 Hydrology – Surface Water Resources and Water Quality

Alternatives C and D could have more adverse impacts to geomorphology than Alternatives A and B because additional channel bed degradation may occur during Restoration Flows as the upstream channel adjusts to the lowered base-level control resulting from modifications to Mendota Dam. This potential effect would be minimized by floodplain grading during construction.

Similarly, Alternatives C and D could have more adverse impacts on water quality than Alternatives A and B because of mobilization of contaminated sediments in the San Joaquin arm of Mendota Pool. However, long-term agricultural activities in the floodplain would have more adverse effects on water quality in Alternatives A, B, and D than in Alternative C. Agricultural fields in the floodplain could convey agricultural return flows (if not recaptured for reuse) and runoff to the river which can contain nutrients and pesticides.

26.8.12 Hydrology – Wetlands and Aquatic Resources

Alternatives C and D would potentially result in the most adverse impacts to wetlands because these alternative could impact more wetland area than Alternatives A and B (Table 26-3). However, conservation measures would be implemented to avoid, minimize, or compensate for adverse effects on waters of the United States and waters of the State, including wetlands, and these measures would be implemented as part of the Action Alternatives. Alternatives B and D would provide more opportunities for restoration of wetlands and other waters with hydric soils than Alternatives A and C (see Table 26-3). Overall, Alternative B would have the least adverse impacts to wetlands and other waters of the United States while providing more restoration opportunities for wetlands and other waters with hydric soils.

26.8.13 Land-Use Planning and Agricultural Resources

Action Alternatives would impact land-use planning and agricultural resources as a result of removal of land from intensive agricultural production, conversion of designated farmland to nonagricultural uses, cancellation of Williamson Act contracts, degradation of agricultural land productivity, and conflicts with applicable land use plans. Alternative B would have the least adverse impact to land-use planning and agricultural resources due to the permanent loss of designated Farmland (see Table 26-3).

26.8.14 Noise and Vibration

Action Alternatives have similar noise-related impacts, with Alternatives A and B having slightly more adverse effects than Alternatives C and D due to traffic-related noise during construction activities (Table 26-3). Alternatives C and D have greater vibration-related impacts than Alternatives A and B due to proximity of pile driving activities near sensitive receivers.

26.8.15 Paleontological Resources

Action Alternatives could impact paleontological resources if encountered during ground disturbing construction activities. Project mitigation measures would be implemented to reduce potential impacts and therefore potential impacts from Project alternatives are similar.

26.8.16 Public Health and Hazardous Materials

Action Alternatives could impact public health and hazardous materials by creating or exposing new hazards or by exposing construction workers or the public to existing hazards. Mitigation measures would be implemented under the Action Alternatives to avoid or minimize these effects. Therefore Project alternatives would have similar effects.

26.8.17 Recreation

Action Alternatives would have some beneficial impacts to recreation through enhanced fisheries-based recreation opportunities. Alternatives B and D would have more adverse impacts to recreation than Alternatives A and C because these alternatives have the longest construction periods (see Table 26-2). Alternative A would have the least adverse impacts to recreation because this alternative has the shortest construction period.

26.8.18 Socioeconomics and Economics

Action Alternatives would provide some employment benefits and beneficial regional economic effects due to construction activities and Project operation, with Alternative A providing the most benefits. Project alternatives would impact agricultural production and agricultural related employment. Alternative D would have the most adverse long-term effects on agricultural production and employment, while Alternative C would have the least adverse long-term effects (Table 26-3).

26.8.19 Transportation and Traffic

Alternative A would have the most adverse impacts to transportation and traffic due to added construction-related traffic to the roadway circulation system (i.e., San Mateo Avenue, SR 33, and SR 180). Alternatives C and D and would have the least adverse impacts to transportation and traffic due to construction-related traffic (see Table 26-3).

Action Alternatives would also create a temporary roadway closure that may affect emergency access/emergency response times to areas immediately north of the San Mateo Avenue crossing. Alternatives D and B would also create a permanent roadway closure at San Mateo Avenue crossing and Alternative A would result in a permanent roadway closure at Drive 10 ½ (which is only used for emergency access). Overall, Alternative C would provide the least adverse impacts to transportation and traffic.

26.8.20 Utilities and Service Systems

Many of the Project impacts to utilities and service would be the same for the Action Alternatives. To minimize and avoid disruption of subsurface utilities from ground disturbing activities, Project proponents would confirm the location of existing underground utilities; coordinate with the owners of transmission lines and pipelines; design restoration actions to avoid affecting underground facilities, if feasible; and coordinate with the utility owner to shut off and relocate the utilities, if necessary. Therefore Project alternatives would have similar effects.

26.8.21 Visual Resources

Action Alternatives would create similar construction-related impacts to visual resources and mitigation measures would be implemented to minimize these effects. Long-term effects to visual quality at the San Mateo Avenue crossing would improve with any of the Action Alternatives. Alternatives C and D would impact visual resources at Mendota Pool Park and the Mendota Dam area while Alternative A and B would not impact visual resources in these areas. Conversely, Alternatives A and B would impact visual resources at the Bass Avenue Residential Area, while Alternatives C and D would not cause impacts in this area.

26.9 Mitigation Monitoring and Reporting Program

The requirement for a mitigation monitoring or reporting program is introduced in the State CEQA Guidelines (Cal. Code Regs., tit. 14, §15091). This section of the State CEQA Guidelines directs the public agency approving or carrying out the Project (CSLC, as the State lead agency) to make specific written findings for each significant impact identified in the EIR. When making the required findings, the agency will also adopt a program for reporting on or monitoring the changes that it has either required in the Project or made a condition of approval to avoid or substantially lessen significant environmental effects. These mitigation measures must be fully enforceable through permit conditions, agreements, or other measures.

Section 15097 was added to the State CEQA Guidelines on October 23, 1998. It requires the public agency to adopt a program for monitoring or reporting on the revisions that it has required in the Project and the measures it has imposed to mitigate or avoid significant environmental effects. Reporting or monitoring responsibilities may be delegated to another public agency or private entity. However, until mitigation measures have been completed, the State lead agency (CSLC) remains responsible for ensuring that implementation of the mitigation measures occurs in accordance with the program.

The CSLC may choose whether its program will monitor mitigation, report on mitigation, or both.

- Reporting generally consists of a written compliance review that is presented to the decision-making body or authorized staff person. A report may be required at various stages during project implementation or upon completion of the mitigation measure. It is suited to projects that have readily measurable or quantitative mitigation measures or that already involve regular review.
- Monitoring is generally an ongoing or periodic process of project oversight. It is suited to projects with complex mitigation measures that are expected to be implemented over a period of time.

The public is allowed access to records and reports used to track the monitoring program. Monitoring records and reports will be made available for public inspection by the CSLC or its designee on request.

26.9.1 Matrix

The mitigation monitoring and reporting program for the Project is provided in Table 26-4, below. Table 26-4 includes all Project impacts that were identified as significant or potentially significant. Impacts that are significant or potentially significant, but unavoidable, are those where no mitigation can reduce the impact to a less-than-significant level. For impacts that are less than significant, mitigation is not required by CEQA. A complete description of each impact and mitigation measure is found in the previous chapters of this EIS/R.

For each impact and mitigation measure, the matrix identifies the location where the impact occurs and where the mitigation measure should be applied; the

monitoring/reporting action to be taken by the monitor or lead agency; the effectiveness criteria; the agency responsible for ensuring that the action occurs; and the timing requirements for implementation. In most cases, the Reclamation and/or the CSLC are responsible for evaluating monitoring data and compliance with program requirements.

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
Biological Resources – Fisheries, Biological Resources – Vegetation, Biological Resources – Wildlife, Climate Change and Greenhouse Gas Emissions, Geology and Soils, Hydrology – Flood Management, Hydrology – Wetlands and Aquatic Resources, Socioeconomics and Economics and Utilities and Service Systems – These sections contain no mitigation measures for the Project impacts.						
Air Quality						
Impact AQ-1: *Create Excess Amounts of Construction Related Criteria Air Pollutants that Exceed SJVAPCD Thresholds of Significance or Cause or Contribute to Exceedances of the AAQS.*	Mitigation Measure AQ-1A: *Reduce Criteria Exhaust Emissions from Construction Equipment.*	The mitigation will apply to all construction areas.	Adequacy of the proposed practices will be confirmed with Reclamation construction managers and CSLC monitors as detailed in the Monitoring and Reporting Schedule submitted to the SJVAPCD. The SJVAPCD would prepare a Monitoring and Reporting Schedule Compliance letter upon completion.	Effectiveness will be based on the emissions calculated based on actual equipment used and operating hours with a minimum performance criteria equal to the average fleet mix as set forth in the ARB's latest Off-road Construction Emission Database. This will be detailed in the Air Impact Assessment and Monitoring and Reporting Schedule submitted to the SJVAPCD in conjunction with ISR Rule 9510.	Reclamation and CSLC.	Mitigation will be ongoing over the construction timeframe.
	Mitigation Measure AQ-1B: *Reduce Criteria Exhaust Emissions from Material Hauling Vehicles.*	The mitigation will apply to all construction areas.	Adequacy of the proposed practices will be confirmed with Reclamation construction managers and CSLC monitors as detailed in the Monitoring and Reporting Schedule submitted to the	Effectiveness will be based on the emissions calculated based on actual equipment used and operating hours with a minimum performance criteria equal to the average fleet mix as set forth in the ARB's latest EMFAC emission	Reclamation.	Mitigation will be ongoing over the construction timeframe.

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
			SJVAPCD. The SJVAPCD would prepare a Monitoring and Reporting Schedule Compliance letter upon completion.	database. This will be detailed in the Air Impact Assessment and Monitoring and Reporting Schedule submitted to the SJVAPCD in conjunction with ISR Rule 9510.		
	Mitigation Measure AQ-1C: *Offset Project Construction Emissions through a SJVAPCD Voluntary Emission Reduction Agreement.*	The mitigation will apply to all construction areas.	Adequacy of the proposed practices will be confirmed with the SJVAPCD as detailed in the Monitoring and Reporting Schedule submitted to the SJVAPCD. The SJVAPCD would prepare a Monitoring and Reporting Schedule Compliance letter upon completion.	Effectiveness will be based on actual equipment used and operating hours for any emissions that are not reduced by on-site mitigation. This will be detailed in the Air Impact Assessment and Monitoring and Reporting Schedule submitted to the SJVAPCD in conjunction with ISR Rule 9510.	Reclamation.	Mitigation will be ongoing over the construction timeframe.
Impact AQ-2: *Conflict with Applicable Plans or Policies Related to Air Quality.*	Mitigation Measure AQ-2: *Reduce or Offset Project Emissions.*	The mitigation will apply to all construction areas.	Adequacy of the proposed practices will be confirmed with the SJVAPCD or Reclamation construction managers and CSLC monitors, as detailed in the Monitoring and Reporting Schedule submitted to the	Effectiveness will be based on actual equipment used and operating hours for any emissions that are not reduced by on-site mitigation. This will be detailed in the Air Impact Assessment and Monitoring and Reporting Schedule	Reclamation.	Mitigation will be ongoing over the construction timeframe.

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
			SJVAPCD. The SJVAPCD would prepare a Monitoring and Reporting Schedule Compliance letter upon completion.	submitted to the SJVAPCD in conjunction with ISR Rule 9510.		
Impact AQ-3: *Expose Sensitive Receptors to Substantial Air Pollutants Associated with Construction.*	Mitigation Measure AQ-3A: *Reduce Diesel Particulate Matter Emissions from Construction Equipment.*	The mitigation will apply to all construction areas.	Adequacy of the proposed practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on use of ARB certified after-market control devices or EPA certified engines.	Reclamation.	Mitigation will be ongoing over the construction timeframe.
	Mitigation Measure AQ-3B: *Reduce Diesel Particulate Matter Emissions from Material Hauling Vehicles.*	The mitigation will apply to all construction areas.	Adequacy of the proposed practices will be confirmed with Reclamation construction managers and CSLC monitors as detailed in the Monitoring and Reporting Schedule submitted to the SJVAPCD. The SJVAPCD would prepare a Monitoring and Reporting Schedule Compliance letter upon completion.	Effectiveness will be based on the emissions calculated based on actual equipment used and operating hours with a minimum performance criteria equal to the average fleet mix as set forth in the ARB's latest EMFAC emission database. This will be detailed in the Air Impact Assessment and Monitoring and Reporting Schedule submitted to the SJVAPCD in conjunction with ISR Rule 9510.	Reclamation.	Mitigation will be ongoing over the construction timeframe.

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
Cultural Resources						
Impact CUL-1: *Effects on Archaeological Resources from Ground Disturbing Activities during Construction.*	Mitigation Measure CUL-1A: *Comply with Section 106 of the NHPA or Equivalent.*	In Project areas with subsequent site-specific studies and where additional access is granted.	Reclamation would report to SHPO and the consulting parties.	Successful compliance with Section 106 of the NHPA or Public Resources Code sections 5024 and 5024.5, as applicable.	Reclamation.	Site-specific environmental reviews will be conducted prior to ground-disturbing activities. Coordination will continue with the relevant Native American tribes in the area, as necessary to complete compliance processes.
	Mitigation Measure CUL-1B: *Conduct Subsurface Testing and/or Archaeological Monitoring in Proximity to Identified Sites or Areas of Sensitivity.*	Construction areas with ground-disturbing activities occurring in native sediments/soils near known archaeological resources, as well as any areas of proposed disturbance in areas determined to be highly or very highly sensitive for buried archaeological resources by Byrd et al. (2009) or a subsequent Project-specific geoarchaeological sensitivity analysis.	Geoarchaeological testing will occur prior to, and/or archaeological monitoring will occur during, specified ground-disturbing activities. Reclamation will report to SHPO and the consulting parties.	Performance tracking of this mitigation measure is based upon successful implementation and the approval of the documentation by SHPO and appropriate consulting parties.	Reclamation.	Geoarchaeological testing will occur prior to ground disturbing activities. Active archaeological monitoring, as necessary, will occur throughout the duration of these specific ground-disturbing activities.

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
	Mitigation Measure CUL-1C: *Halt Work in the Event of an Archaeological Discovery.*	Active construction areas during ground-disturbing activities.	Reclamation and/or CSLC will report to SHPO and the consulting parties.	Performance tracking of this mitigation measure will be based on successful implementation and approval of documentation by SHPO and appropriate consulting parties.	Reclamation and CSLC.	Mitigation will be ongoing over the construction timeframe.
	Mitigation Measure CUL-1D: *Plan an Intentional Site Burial Preservation in Place.*	Active construction areas in the event of an archaeological discovery where avoidance is not feasible and capping can be designed to effectively minimize Project effects to the discovery.	Reclamation and/or CSLC will make provisions with the archaeologist to monitor the site after the burial process is complete. Reclamation and/or CSLC will report to SHPO and the consulting parties.	Performance tracking of this mitigation measure will be based on successful implementation and the approval of the documentation by SHPO and appropriate consulting parties.	Reclamation and CSLC.	Mitigation will occur in the event of an archaeological discovery where avoidance is not feasible and would be ongoing over the construction timeframe.
	Mitigation Measure CUL-1E: *Avoid Soil Borrowing in the Vicinity of Known Archaeological Resources.*	Within the vicinity of known archaeological resources, including CA-FRA-45 and CA-FRA-106.	Reclamation and/or CSLC will report to SHPO and the consulting parties.	Avoidance of areas within delineated site boundaries.	Reclamation and CSLC.	At least 90-days prior to proposed borrowing activities.
Impact CUL-2: *Effects on Historic Properties Listed or Eligible for Listing in the National or California Register.*	Mitigation Measure CUL-2: *Follow the Secretary of the Interior's Standards for the Treatment of Historic Properties.*	Construction activities at Mendota Dam.	Reclamation and/or CSLC will report to SHPO and the consulting parties.	Secretary of the Interior's Standards are met.	Reclamation and CSLC.	Prior to and during construction activities at Mendota Dam.

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
Hydrology – Groundwater						
Impact GRW-1: *Temporary Construction-Related Effects on Groundwater Quality.*	Mitigation Measure GRW-1A: *Prepare and Implement a Stormwater Pollution Prevention Plan.*	Project areas with active construction or used by construction personnel, including access roads, staging and storage areas, borrow sites, within the river channel and on adjacent uplands.	At a minimum, annual reports will be submitted to the State Water Resources Control Board via the Storm Water Multiple Application and Report Tracking System.	Performance tracking will be based on successful compliance with the Statewide NPDES Construction General Permit.	Reclamation and the construction contractor.	The SWPPP will be developed prior to construction and will be implemented during construction.
	Mitigation Measure GRW-1B: *Prepare and Implement a Construction Groundwater Management Plan.*	Project areas with active dewatering.	At a minimum, annual reports will be submitted to Reclamation managers summarizing the monitoring data obtained during the previous year(s).	Performance tracking of this mitigation measure will be based upon successful compliance with the Statewide NPDES Construction General Permit and/or General Permit for Low Threat Discharges.	Reclamation and the construction contractor.	The Construction Groundwater Management Plan will be developed prior to construction and will be implemented during construction.
Hydrology – Surface Water Resources and Water Quality						
Impact SWQ-1: *Construction-Related Effects on Water Quality.*	Mitigation Measure SWQ-1: *Development and Implementation of SWPPP.*	Project areas with active construction or used by construction personnel, including access roads, staging and storage areas, borrow sites, and areas within the river channel and on adjacent uplands.	At a minimum, annual reports will be submitted to the SWRCB via the Storm Water Multiple Application and Report Tracking System.	Performance tracking will be based on successful compliance with the Statewide NPDES Construction General Permit.	Reclamation and the construction contractor.	The SWPPP will be developed prior to construction and will be implemented during construction.

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
Impact SWQ-3: *Long-Term Effects on Water Quality from Floodplain Inundation of Prior Agricultural Soils.*	Mitigation Measure SWQ-3: *Minimize Use of Pesticide and Herbicide Contaminated Soil.*	Floodplain areas or areas used for borrow materials.	Adequacy of the proposed construction practices will be confirmed with Reclamation managers and CSLC monitors.	Effectiveness will be based on compliance with testing and risk assessment guidelines.	Reclamation and the construction contractor.	Prior to construction of Project levees or floodplain grading.
Land Use Planning and Agricultural Resources						
Impact LU-1: *Removal of Land from Agricultural Production.*	Mitigation Measure LU-1: *Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*	Agricultural lands within the Project area.	Adequacy of the proposed activities will be confirmed with Reclamation project managers and CSLC monitors.	Effectiveness will be based on annual reporting of the number of acres removed from agricultural production during implementation.	Reclamation and CSLC.	Mitigation will be ongoing over the construction timeframe.
Impact LU-2: *Conversion of Designated Farmland to Non-Agricultural Uses.*	Mitigation Measure LU-2: *Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*	Agricultural lands within the Project area.	Adequacy of the proposed activities will be confirmed with Reclamation project managers and CSLC monitors.	Effectiveness will be based on annual reporting of the number of acres removed from agricultural production during implementation.	Reclamation and CSLC.	Mitigation will be ongoing over the construction timeframe.
Impact LU-3: *Conflict with Williamson Act Contracts.*	Mitigation Measure LU-3: *Preserve Agricultural Productivity of Designated Farmland to the Extent Possible.*	Agricultural lands within the Project area.	Adequacy of the proposed activities will be confirmed with Reclamation project managers and CSLC monitors.	Effectiveness will be based on annual reporting of the number of acres removed from agricultural production during implementation.	Reclamation and CSLC.	Mitigation will be ongoing over the construction timeframe.
Impact LU-5: *Conflict with Applicable Land*	Mitigation Measure LU-5: *Notify County Planning Agencies*	Agricultural lands within the Project area.	Notifications of zoning and land use plan inconsistencies will be	Effectiveness will be based on whether updates can be made by	Reclamation and CSLC.	Formal notification of any zoning and/or land use plan

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
Use Plans Regarding Agricultural Lands.	*of General Plan and Zoning Ordinance Inconsistencies.*		confirmed with Reclamation project managers and CSLC monitors.	county planning agencies.		inconsistencies would occur after project approval.
Noise and Vibration						
Impact NOI-1: *Exposure of Sensitive Receptors to Temporary Construction Noise.*	Mitigation Measure NOI-1: *Reduce Temporary and Short-Term Noise Levels from Construction-Related Equipment Near Sensitive Receptors.*	Project areas where construction activities will be conducted within 2,000 feet of noise-sensitive receptors.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on public complaints to the SJRRP.	Reclamation and the construction contractor.	Ongoing when construction activities occur outside of construction noise exempt hours.
Impact NOI-2: *Exposure of Sensitive Receptors to Temporary Construction Vibration.*	Mitigation Measure NOI-2: *Minimize Vibration Related Effects.*	Project areas where pile driving construction activities will be conducted within 300 feet or less of sensitive receptors.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on public complaints to the SJRRP.	Reclamation and the construction contractor.	Ongoing during pile driving construction activities within 300 feet or less of residential structures.
Impact NOI-3: *Increased Off-Site Vehicular Traffic Noise due to Construction Related Trips.*	Mitigation Measure NOI-3: *Reduce Temporary Noise Levels from Construction-Related Traffic Increases Near Sensitive Receptors.*	Haul routes near sensitive receptors along San Mateo Avenue.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on public complaints to the SJRRP.	Reclamation and the construction contractor.	Ongoing when construction activities occur outside of construction noise exempt hours.

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
Paleontological Resources						
Impact PAL-1: *Possible Damage to or Destruction of Unique Paleontological Resources.*	Mitigation Measure PAL-1: *Stop Work if Paleontological Resources Are Encountered During Earthmoving Activities and Implement Recovery Plan.*	Construction areas with active excavation.	Preparation of a recovery plan in accordance with SVP Guidelines, if paleontological resources are discovered during earthmoving activities and notification of CSLC monitors if find is on land under the CSLC's jurisdiction.	Performance tracking of this mitigation measure will be based on the stoppage in work in the vicinity of the find and meeting the recommendations in the recovery plan.	Reclamation.	Mitigation would be ongoing over the construction timeframe.
Public Health and Hazardous Materials						
Impact HAZ-2: *Increased Exposure to Hazardous Materials for People Residing or Working in the Project Area.*	Mitigation Measure HAZ-2A: *Follow General Hazardous Materials Guidelines.*	Location: Project areas with active construction or used by construction personnel including access roads, staging and storage areas, and borrow sites.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on incidence of hazardous material spills.	Reclamation and CSLC.	Ongoing over the construction timeframe.
	Mitigation Measure HAZ-2B: *Properly Dispose of Hazardous Building Components.*	Construction areas with potential hazardous building components.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on compliance with health and safety guidelines.	Reclamation, CSLC, and the construction contractor.	Ongoing over the construction timeframe.

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
	Mitigation Measure HAZ-2C: *Properly Dispose of Pesticides.*	Project areas with active construction or used by construction personnel with pesticide or herbicide containers.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on compliance with disposal guidelines.	Reclamation, CSLC, and the construction contractor.	Ongoing over the construction timeframe.
	Mitigation Measure HAZ-2D: *Properly Manage Discolored or Odiferous Soils.*	Project areas with active construction or used by construction personnel with discolored or odiferous soils.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on compliance with regulatory guidelines.	Reclamation, CSLC, and the construction contractor.	Ongoing over the construction timeframe.
	Mitigation Measure HAZ-2E: *Properly Remove Underground Storage Tanks.*	Project areas with active construction or used by construction personnel including access roads, staging and storage areas, and borrow sites with underground storage tanks.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on compliance with regulatory guidelines.	Reclamation, CSLC, and the construction contractor.	Ongoing over the construction timeframe.
Impact HAZ-3: *Creation of a Substantial Hazard from Disturbance of Known Hazardous Material Sites.*	Mitigation Measure HAZ-3: *Minimize Disturbance to Known Hazardous Material Sites.*	Project areas with active construction or used by construction personnel including access roads, staging and storage areas, and borrow sites that have abandoned oil and gas wells or asbestos	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on compliance with regulatory guidelines.	Reclamation, CSLC, and the construction contractor.	Ongoing over the construction timeframe.

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
		containing material.				
Impact HAZ-4: *Creation of a Substantial Hazard from Mobilization of Soil Contaminants on the Floodplain.*	Mitigation Measure HAZ-4: *Minimize Use of Pesticide and Herbicide Contaminated Soil.*	Project areas with active construction or used by construction personnel including borrow sites.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on compliance with testing and risk assessment guidelines.	Reclamation, CSLC, and the construction contractor.	Ongoing over the construction timeframe.
Impact HAZ-5: *Exposure of People to Increased Risk of Diseases.*	Mitigation Measure HAZ-5A: *Minimize Exposure to Potential West Nile Virus Carrying Vectors.*	Project areas with active construction or used by construction personnel.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on evidence of mosquitos and complaints of mosquito bites.	Reclamation, CSLC, and the construction contractor.	Ongoing over the construction timeframe.
	Mitigation Measure HAZ-5B: *Minimize Exposure to Potential Hantavirus Vectors.*	Project areas with active construction or used by construction personnel, particularly in enclosed buildings.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on implementation of construction training.	Reclamation, CSLC, and the construction contractor.	Ongoing over the construction timeframe.
	Mitigation Measure HAZ-5C: *Minimize Exposure to Valley Fever.*	Project areas with active construction or used by construction personnel.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on compliance with dust control measures.	Reclamation, CSLC, and the construction contractor.	Ongoing over the construction timeframe.

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
Impact HAZ-6: *Creation of a Substantial Hazard from Decommissioned Wells.*	Mitigation Measure HAZ-6: *Minimize the Disturbance of Idle or Abandoned Wells.*	Project areas with active construction or used by construction personnel, including borrow sites.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on implementation of the pre-construction measures.	Reclamation, CSLC, and the construction contractor.	Ongoing over the construction timeframe.
Recreation						
Impact REC-1: *Construction-Related Effects on Recreation Opportunities and Facilities.*	Mitigation Measure REC-1: *Minimize Construction Effects on Recreation Uses.*	The location of proposed construction area security modifications will vary as construction activities move throughout the Project area but would be focused primarily at Mendota Pool.	Adequacy of the proposed construction practices will be confirmed with Reclamation managers and CSLC monitors.	Effectiveness will be based on public complaints to the SJRRP.	Reclamation and CSLC.	Mitigation will be ongoing over the construction timeframe.
Impact REC-2: *Permanent Displacement of Existing Recreation Uses and Access Restrictions from Project Facilities.*	Mitigation Measure REC-2: *Establish Boat Portage Facilities Around Project Facilities.*	The location of the new portage facilities will be at Project structures (i.e., between the fish barrier and Mendota Pool, at the Mendota Pool Dike, and at the South Canal bifurcation structure).	Adequacy of the proposed portage facilities will be confirmed with Reclamation managers and CSLC monitors.	Effectiveness will be based on public complaints to the SJRRP.	Reclamation and CSLC.	Mitigation will be completed at the time of structure installations.

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
Transportation and Traffic						
Impact TRA-4: *Potential to Result in Inadequate Emergency Access.*	Mitigation Measure TRA-4A: *Provide Temporary Roadway and Crossing at San Mateo Avenue.*	Active construction areas along San Mateo Avenue.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on access availability.	Reclamation and the construction contractor.	Ongoing over the construction timeframe.
	Mitigation Measure TRA-4B: *Use Construction Sequencing to Provide Continuous Emergency Access at Drive 10 ½.*	Active construction areas at Drive 10 ½.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on access availability.	Reclamation and the construction contractor.	Ongoing over the construction timeframe.
Visual Resources						
Impact VIS-1: *Construction Related Effects on the Visual Quality of the Project Site and Its Surroundings.*	Mitigation Measure VIS-1: *Minimize Visual Disruption from Construction Activities.*	The location of proposed construction area modifications will vary as construction activities move throughout the Project area but will be focused primarily at Mendota Pool Park and San Mateo Avenue. Fencing will be implemented where topography and Project area activities allow.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on public complaints to the SJRRP.	Reclamation, CSLC, and the contractor.	Mitigation will be ongoing over the construction timeframe.

Table 26-4.
Mitigation Monitoring and Reporting Program

Impact	Mitigation Measure	Location	Monitoring / Reporting Action	Effectiveness Criteria	Responsible Agency	Timing
Impact VIS-6: *Substantial Changes in Light or Glare.*	Mitigation Measure VIS-6: *Require Conformance to Lighting Standards.*	The location of proposed construction area modifications will vary as construction activities move throughout the Project area but will be focused primarily at the Mendota Dam area and the Bass Avenue residential area.	Adequacy of the proposed construction practices will be confirmed with Reclamation construction managers and CSLC monitors.	Effectiveness will be based on public complaints to the SJRRP.	Reclamation, CSLC, and the contractor.	Mitigation will be ongoing over the construction timeframe.

Key:

AAQS = ambient air quality standards
ARB = California Air Resources Board
CSLC = California State Lands Commission
EPA = U.S. Environmental Protection Agency
ISR = indirect source rule
NHPA = National Historic Preservation Act
NPDES = National Pollutant Discharge Elimination System
Reclamation = U.S. Department of the Interior, Bureau of Reclamation
SHPO = State Historic Preservation Officer
SJRRP = San Joaquin River Restoration Program
SJVAPCD = San Joaquin Valley Air Pollution Control District
SWPPP = stormwater pollution prevention plan

26.9.2 Environmental Commitments

The following section summarizes the environmental commitments detailed in Section 2.2.10 that would be implemented with the Action Alternatives to avoid potentially adverse environmental consequences. These commitments are consistent with those commitments provided in the PEIS/R.

Conservation Strategy

As part of Program implementation, a comprehensive strategy for the conservation of listed and sensitive species and habitats has been prepared, and will be implemented in coordination with U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and California Department of Fish and Wildlife (DFW). The goals of the strategy are as follows:

- Conserve riparian vegetation and waters of the United States, including wetlands
- Control and manage invasive species
- Conserve special-status species

The Program's Conservation Strategy includes conservation measures for biological resources that may be affected by Project actions (listed in Table 26-5). These measures are the same as those presented in the PEIS/R (SJRRP 2011a, pages 2-55 to 2-79) and those detailed in Table 2-8 in Section 2.2.10 of this EIS/R.

Table 26-5.
Conservation Measures for Biological Resources

Identifier	Conservation Measure
VELB	**Valley Elderberry Longhorn Beetle**
VELB-1	*Avoid and Minimize Effects to Species*
VELB-2	*Compensate for Temporary or Permanent Loss of Habitat*
BNLL	**Blunt-Nosed Leopard Lizard**
BNLL-1	*Avoid and Minimize Effects to Species*
BNLL-2	*Compensate for Temporary or Permanent Loss of Habitat or Species*
PLANTS	**Other Special-Status Plants**
PLANTS-1	*Avoid and Minimize Effects to Special-Status Plants*
GGS	**Giant Garter Snake**
GGS-1	*Avoid and Minimize Loss of Habitat for Giant Garter Snake*
GGS-2	*Compensate for Temporary or Permanent Loss of Habitat*
WPT	**Western Pond Turtle**
WPT-1	*Avoid and Minimize Loss of Individuals*
EAGLE	**Bald Eagle and Golden Eagle**
EAGLE-1	*Avoid and Minimize Effects to Bald and Golden Eagles (as Defined in the Bald and Golden Eagle Protection Act)*
SWH	**Swainson's Hawk**
SWH-1	*Avoid and Minimize Impacts to Swainson's Hawk*
SWH-2	*Compensate for Loss of Nest Trees and Foraging Habitat*

Table 26-5.
Conservation Measures for Biological Resources

Identifier	Conservation Measure
RAPTOR	**Other Nesting Raptors**
RAPTOR-1	*Avoid and Minimize Loss of Individual Raptors*
RAPTOR-2	*Compensate for Loss of Nest Trees*
RNB	**Riparian Nesting Birds: Least Bell's Vireo**
RNB-1	*Avoid Effects to Species*
RNB-2	*Avoid, Minimize, and Compensate for Effects to Species*
MTBA	**Other Birds Protected by the Migratory Bird Treaty Act**
MBTA-1	*Avoid and Minimize Effects to Species*
BRO	**Burrowing Owl**
BRO-1	*Avoid Loss of Species*
BRO-2	*Minimize Impacts to Species*
BAT	**Special-Status Bats**
BAT-1	*Avoid and Minimize Loss of Species*
BAT-2	*Compensate for Loss of Habitat*
FKR	**Fresno Kangaroo Rat**
FKR-1	*Avoid and Minimize Effects to Species*
FKR-3	*Compensate for Temporary or Permanent Loss of Habitat or Species*
SJKF	**San Joaquin Kit Fox**
SJKF-1	*Avoid and Minimize Effects to Species*
PL	**Pacific Lamprey**
PL-1	*Avoid and Minimize Effects to Species*
RHSNC	**Riparian Habitat and Other Sensitive Natural Communities**
RHSNC-1	*Avoid and Minimize Loss of Riparian Habitat and Other Sensitive Natural Communities*
RHSNC-2	*Compensate for Loss of Riparian Habitat and Other Sensitive Natural Communities*
WUS	**Waters of the United States/Waters of the State**
WUS-1	*Identify and Quantify Wetlands and Other Waters of the United States*
WUS-2	*Obtain Permits and Compensate for Any Loss of Wetlands and Other Waters of the United States/Waters of the State*
INV	**Invasive Plants**
INV-1	*Implement the Invasive Vegetation Monitoring and Management Plan*
CP	**Conservation Plans**
CP-1	*Remain Consistent with Approved Conservation Plans*
CP-2	*Compensate Effects Consistent with Approved Conservation Plans*
GS	**Southern Distinct Population Segment of North American Green Sturgeon**
GS-1	*Avoid and Minimize Loss of Habitat and Individuals*
CVS	**Central Valley Steelhead**
CVS-1	*Avoid Loss of Habitat and Risk of Take of Species*
CVS-2	*Minimize Loss of Habitat and Risk of Take of Species*
SRCS	**Central Valley Spring-Run Chinook Salmon**
SRCS-1	*Avoid and Minimize Loss of Habitat and Individuals*
EFH	**Essential Fish Habitat (Pacific Salmonids)**
EFH-1	*Avoid Loss of Habitat and Risk of Take of Species*
EFH-2	*Minimize Loss of Habitat and Risk of Take from Implementation of Construction Activities*

Minimize Flood Risk from Interim and Restoration Flows

The Program's strategy for minimizing flood risk is to limit the maximum downstream extent and rate of Interim and Restoration flows for the given reach to then-existing channel capacities. This strategy is incorporated by reference from the PEIS/R (SJRRP 2011a, pages 2-22 through 2-28) and summarized in Section 2.2.10 of this EIS/R. These Program-wide commitments are documented in the PEIS/R Record of Decision (ROD), and no new Project-level actions to minimize flood risk from Interim and Restoration flows are being proposed.

Other Environmental Commitments

The other environmental commitments that will be implemented by the Project proponents to avoid potentially adverse environmental consequences are detailed in Section 2.2.10 and summarized here. Many of these measures are consistent with those specified in the PEIS/R ROD.

Air Quality

- The Project proponents will comply with San Joaquin Valley Air Pollution Control District (SJVAPCD) Regulation VIII.
- The Project proponents will comply with SJVAPCD Rule 9510, "Indirect Source Review."

Geology and Soils

- Site-specific geotechnical exploration, testing, and analysis will be conducted prior to final design.
- The Project proponents will prepare and implement a stormwater pollution prevention plan that complies with applicable Federal regulations concerning construction activities. (This measure is the same as GRW-1A and SQW-1.)
- Excavation of borrow materials will be done in accordance with Reclamation design standards, and comply with provisions of the Clean Water Act Section 402 and the National Pollutant Discharge Elimination System Construction General Permit.

Public Health and Hazardous Materials

- The Project proponents will comply with the California Environmental Protection Agency's (Cal/EPA's) Unified Program.
- The Project proponents will comply with Federal, State, and local hazardous materials regulations, as applicable, monitored by the State (e.g., California Occupational Safety and Health Administration [Cal/OSHA], Department of Toxic Substances Control, California Highway Patrol) and/or local jurisdictions.
- The Project proponents will adopt reasonable wildland fire safety strategies and have the firefighting equipment required by Cal/OSHA during all phases of construction.

Transportation and Traffic

- The Project proponents will comply with Department of Motor Vehicles codes by requiring contractors and employees to be properly licensed and endorsed when operating commercial vehicles.
- The Project proponents will comply with California Vehicle Code section 35551 by enforcing compliance with weight restrictions on vehicles traveling on freeways and highways and by requiring heavy haulers to obtain permits, if required, prior to delivery of any heavy haul load.
- The Project proponents will comply with California Vehicle Code section 35780 by requiring heavy haulers to obtain a Single-Trip Transportation Permit prior to delivery of any oversized load.
- The Project proponents will acquire the necessary permits and approval from the California Department of Transportation (Caltrans) for relocation of any structures or fixtures necessary to telegraph, telephone, or electric power lines or of any ditches, pipes, drains, sewers, or underground structures located in the public rights-of-way.
- As required by the PEIS/R ROD, the Project proponents will prepare and implement a traffic management plan that identifies the number of truck trips, time of day for arrival and departure of trucks, limits on number of truck trips, and traffic circulation control measures. During project construction, access to existing land uses will be maintained at all times, with detours used as necessary during road closures. The traffic management plan will be submitted to the appropriate county public works, fire, police, and sheriff departments for comments.

Utilities and Service Systems

- As required by the PEIS/R ROD, to minimize and avoid disruption of subsurface utilities from ground disturbing activities, Project proponents will (1) confirm the location of existing underground utilities, (2) coordinate with the owners of transmission lines and pipelines, (3) design restoration actions to avoid affecting underground facilities, if feasible, and (4) coordinate with the utility owner to shut off and relocate the utilities, as necessary.
- The location of public utilities will be confirmed and appropriate notifications will be made by contacting utility providers (e.g., power and communication utility service, and irrigation district service) who operate, maintain or own utilities in the Project area.
- Construction contractors will request an underground service alert from Underground Service Alert North in advance of earthmoving activities to locate and avoid underground utilities.
- Solid waste removed from the Project area will be disposed of in a permitted landfill. The operator of the recycling/disposal location will be notified and

Project proponents will obtain approval for the type and amount of solid waste that will be generated.

Permitting

Reclamation will obtain all necessary permits, as required by law. The permits and approvals that may be required for implementation of the Project are described in Section 2.2.10, Table 2-10. In general, Federal and State actions (permit issuance) will require a signed ROD (NEPA) and findings, EIR certification, and Notice of Determination (NOD) documents (CEQA). Additional information on permit acquisition procedures, submittal package requirements, critical issues, timing, and permit fees is discussed in the Project's Regulatory Compliance TM (SJRRP 2011b).

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27.0 Consultation, Coordination, and Compliance

This chapter summarizes the activities undertaken by U.S. Department of the Interior, Bureau of Reclamation (Reclamation), California State Lands Commission (CSLC), and California Department of Water Resources (DWR) to satisfy National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), and other regulatory requirements, as well as activities undertaken for public and agency involvement. In addition, this chapter lists the needed permits, petitions, compliance documents, etc. for the Project-level actions. For a complete list of Project-level actions, see Chapter 2.0, "Description of Alternatives." This chapter also describes the public scoping process used to involve the public and agencies in the development of the Draft Environmental Impact Statement/Report (EIS/R). Section 27.4, "Distribution List," lists the entities receiving a copy of this EIS/R.

Reclamation and DWR jointly conducted initial public outreach and agency involvement efforts related to development of this EIS/R. Reclamation and CSLC continued these public outreach and agency involvement efforts throughout development of this EIS/R. These consultations assisted Reclamation, CSLC, and DWR in determining the scope of the EIS/R, developing Project components, identifying the range of alternatives, defining potential environmental impacts and the significance of those impacts, and identifying appropriate mitigation measures. These efforts consist of public scoping meetings and ongoing meetings with stakeholders to obtain their input and comments. Reclamation and CSLC will continue to solicit public and agency input by encouraging review of this EIS/R. Past and future public involvement, consultation, and coordination efforts are discussed in Section 27.3.

27.1 Compliance with Related Laws, Rules, Regulations, and Executive Orders

Federal and State laws, rules and regulations, Executive Orders (EOs), and compliance requirements for implementation of the Project alternatives are described in the following sections. Descriptions are organized by Federal, State, and local requirements.

27.1.1 Federal Requirements

Compliance with Federal laws, rules and regulations for implementation of the Project alternatives are summarized below. A total of 27 Federal requirements are identified.

San Joaquin River Restoration Settlement Act

The San Joaquin River Restoration Settlement Act authorizes and directs the Secretary of Interior to implement the Settlement. Sections of the San Joaquin River Restoration Settlement Act, and the relationship between the San Joaquin River Restoration

Settlement Act and Program implementation, are described in Section 28.1 of the Program Environmental Impact Statement/Report (PEIS/R) (San Joaquin River Restoration Program [SJRRP] 2011a, pages 28-1 to 28-9).

National Environmental Policy Act

NEPA is the Nation's broadest environmental law, applying to all Federal agencies and most of the activities they manage, regulate, or fund that affect the environment. It requires Federal agencies to disclose and consider the environmental implications of their proposed actions. NEPA establishes environmental policies for the Nation, provides an interdisciplinary framework for Federal agencies to avoid or minimize environmental effects, and contains action-forcing procedures to ensure that decision makers at Federal agencies take environmental factors into account.

Council on Environmental Quality (CEQ) has adopted regulations and other guidance providing detailed procedures that Federal agencies follow to implement NEPA. The U.S. Department of the Interior has also developed regulations for the implementation of NEPA (43 Code of Federal Regulations [CFR] Part 46). Reclamation will use this EIS/R to comply with NEPA and CEQ and U.S. Department of the Interior regulations to implement specific actions. Project-level actions are analyzed in this EIS/R, and once this EIS/R is finalized and combined with the Record of Decision, it will comprise the complete NEPA compliance for these project-level actions.

Clean Water Act, Section 401

Under Clean Water Act (CWA) Section 401, applicants for a Federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification for the discharge. The certification must be obtained from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over the affected waters at the point where the discharge would originate. Therefore, all projects that have a Federal component and may affect state water quality (including projects that require Federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401.

In California, the authority to grant water quality certification has been delegated to the State Water Resources Control Board (SWRCB), and applications for water quality certification under CWA Section 401 are typically processed by the Regional Water Quality Control Board (RWQCB) with local jurisdiction — in this case, the Central Valley RWQCB. Water quality certification requires evaluation of potential impacts in light of water quality standards and CWA Section 404 criteria governing discharge of dredged and fill materials into waters of the United States. Coordination with the Central Valley RWQCB relative to compliance with CWA Section 401 is discussed below, under Section 27.1.2, "State Requirements."

The proposed action would result in fill and/or dredging of jurisdictional waters of the State, including wetlands, particularly in the San Joaquin River and nearby channels such as the Fresno Slough and Little San Joaquin Slough. As a result, a Section 401 Water Quality Certification would be required for these actions.

Prior to initiating any project-level actions that could result in discharge of pollutants into jurisdictional features, Reclamation will apply for a Section 401 water quality certification from the Central Valley RWQCB.

Clean Water Act, Section 402

Dischargers whose projects disturb 1 or more acres of soil or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 or more acres, are required to obtain coverage under the General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activity (Construction General Permit, 2009-0009-DWQ). Construction activity subject to this permit includes clearing, grading, and disturbances to the ground such as stockpiling or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. In California, the authority to regulate compliance with CWA Section 402 requirements is shared between the SWRCB and the nine RWQCBs. Most enforcement responsibilities are delegated to the RWQCBs; therefore, the lead agency will coordinate with the Central Valley RWQCB to ensure compliance.

To acquire a Construction General Permit, applicants must submit Permit Registration Documents, including a Notice of Intent Form to discharge stormwater, a Stormwater Pollution Prevention Plan (SWPPP), and other documents. The Stormwater Pollution Prevention Plan must be prepared by a Qualified SWPPP Developer and must list best management practices (BMPs) the discharger will use to protect stormwater runoff. Implementation of these BMPs must be overseen by a Qualified SWPPP Practitioner.

Compliance with the General Permit also requires on-site visual monitoring of stormwater and non–stormwater discharges and the submission of annual reports throughout the duration of the Project. Depending on the risk level of the Project, additional monitoring may be required. Once the Project is complete, the applicant must submit a Notice of Termination to be approved by the RWQCB.

The proposed action would result in discharges of waste into waters of the State, which include “any surface water or ground water, including saline waters, within the boundaries of the State.” A National Pollutant Discharge Elimination System (NPDES) permit will be required for construction-related discharges to surface waters.

Clean Water Act, Section 404

Section 404 of the CWA requires that a permit be obtained from the U.S. Army Corps of Engineers (Corps) for the discharge of dredged or fill material into “waters of the United States, including wetlands.” Waters of the United States include traditionally navigable rivers and their tributaries and adjacent wetlands that have a significant nexus to waters of the United States. Waters of the United States are defined for regulatory purposes, at 33 CFR 328.3 (a), as follows:

> *(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of tide;*

(2) All interstate waters, including interstate wetlands;

(3) All other waters such as intrastate lakes, rivers, streams, (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce…

(4) All impoundments of waters otherwise defined as waters of the United States under the definition;

(5) Tributaries of waters identified in paragraphs (a)(1) through (4) of this section;

(6) The territorial seas; and

(7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) (1) through (6) of this section.

CWA Section 404(b) requires that the Corps process permits in compliance with guidelines developed by the U.S. Environmental Protection Agency (EPA). These guidelines, the CWA Section 404(b)(1) Guidelines, require analysis of alternatives available to meet a project's purpose and need, including those alternatives that avoid and minimize discharges of dredged or fill materials in waters. Once alternatives deemed to be practicable have been identified, the Corps must permit the least environmentally damaging practicable alternative.

Actions typically subject to Section 404 requirements are those that would take place in wetlands or stream channels, including intermittent streams, even if they have been realigned or otherwise altered in the past. Activities that require a permit under Section 404 include, but are not limited to, placing fill or riprap, grading, mechanized land clearing, and dredging in waters of the United States. Within stream channels, a permit under Section 404 would be needed for any discharge activity below the ordinary high water mark. The term "ordinary high water mark" refers to "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (33 CFR 328.3(e)). The *Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region of the Western United States* is used to determine the Ordinary High Water Mark (Corps 2008).

The Corps Regulatory Branch issues several types of Section 404 permits. Those most applicable to the proposed action are Nationwide Permits and Individual Permits. Projects with only minimal adverse effects (i.e., fills of less than 0.5 acre of nontidal waters of the United States) can typically be authorized under the Corps' Nationwide Permits program to expedite the environmental compliance process, provided the Project satisfies the

terms and conditions of the particular Nationwide Permits. Since the Project would have more than minimal impacts, it would require an Individual Permit.

The CWA and guidelines outlined in a Memorandum of Agreement (MOA) between the EPA and the Corps dated November 15, 1989, set forth a goal of restoring and maintaining existing aquatic resources. This MOA directs the Corps to strive to avoid adverse impacts and offset unavoidable adverse impacts to existing aquatic resources, and for wetlands, to strive to achieve a goal of no overall net loss of values and functions. The MOA also noted the value of other waters of the United States, including streams, rivers, and lakes. Under the guidelines, all jurisdictional waters of the United States are afforded protection and requirements are outlined for practicable mitigation based on values and functions of the aquatic resources that will be affected.

EPA develops regulations with which the Corps must comply and reviews the permits issued by the Corps. Section 404(c) of the CWA authorizes EPA to veto a Corps decision to issue a permit if a proposed action "will have an unacceptable effect on municipal water supplies, shellfish beds and fishery areas, wildlife, or recreational areas."

The proposed action would result in fill and/or dredge of jurisdictional waters of the United States, including wetlands, especially within the San Joaquin River during any in-river construction activities (e.g., levee removal and construction of the San Mateo Avenue crossing) and at other locations, including Fresno Slough and Little San Joaquin Slough. As a result, this Project will require authorization from the Corps pursuant to Section 404 of the CWA.

Reclamation and DWR consulted early in the planning process with the Corps regarding Section 404 CWA compliance. Reclamation and CSLC have continued the consultation process. Before initiating any project-level actions that could result in discharge into jurisdictional features, the Project proponents will apply for a CWA permit from the Corps. The Corps will evaluate the proposed action to determine whether it is the least environmentally damaging practicable alternative pursuant to Section 404(b)(1) Guidelines.

This EIS/R evaluates the environmental effects on jurisdictional features resulting from the discharge of dredged and fill material to support a Section 404(b)(1) analysis. Additional details specific to restoration and other actions will be submitted during the permitting process. The Corps will determine whether the specific proposed action would be authorized under the Nationwide Permit Program or whether an individual permit would be applicable. Early and ongoing coordination with the Corps, and the requirement to obtain permits from the Corps before initiating any actions, demonstrates that Reclamation is committed to complying with the CWA. Reclamation, DWR, and the Corps have been meeting regularly to discuss Section 404 compliance issues.

Note that Section 404 of the CWA does not apply to authorities granted to the Corps under the Rivers and Harbors Act of 1899 (RHA), except that some of the same waters may be regulated under both statutes. The Corps typically combines the permit

requirements of Section 10 of the RHA and Section 404 of the CWA into a single permitting process.

Rivers and Harbors Act of 1899, as Amended (Sections 14 and Section 10)

RHA addresses activities that involve the construction of, among other structures, dams, bridges, and dikes across any navigable water. The act also addresses placement of obstructions to navigation outside established Federal lines, as well as the excavation or deposition of material in such waters. All of these actions require permits from the Corps. Navigable waters are defined in 33 CFR 329.4 as follows:

> *Those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the waterbody, and is not extinguished by later actions or events which impede or destroy navigable capacity.*

Sections of the RHA applicable to the Project alternatives are described below.

Section 14. Under RHA Section 14 (33 United States Code [USC] 408), referred to as "Section 408," the Secretary of the Army, on the recommendation of the Chief of Engineers, may grant permission for alteration of the Federal levee system if the alteration would not be injurious to the public. These actions could include degradations, raisings, realignments or other alteration or modifications to the Federal levee system which would cause significant changes to the authorized flood control project's scope.

Major alterations to a Federal flood control project, including alterations to channels and levees that change the Federal project's authorized geometry or the hydraulic capacity, would require a Section 408 permit. Section 408 requires authorization from the Corps for the alteration of any sea wall, bulkhead, jetty, dike, levee, wharf, pier, or other work built by a Federal agency for the preservation and improvement of any of its navigable waters or to prevent floods. The types of alterations or modifications that require Section 408 approval include degradations, raisings, and realignments to the flood protection system or any modification where engineering analysis indicates that the system performance is adversely impacted. To receive authorization, the applicant must establish that the proposed alteration will not be injurious to the public interest and will not impair the usefulness of such work.

Section 208.10 (33 CFR 208.10) provides regulations regarding encroachments on Federal flood control structures and facilities that are constructed for local flood protection. Minor, low impact modifications of Federal flood control projects which do not adversely affect the function of the protective system can be approved by the Corps under Section 208.10. These modifications cannot change the authorized geometry or the hydraulic capacity of the Federal project. Small alterations are typically approved under a Central Valley Flood Protection Board (CVFPB) Encroachment Permit and are reviewed and approved by the Corps in accordance with Section 208.10. The Corps would initiate

formal actions under Section 408 and Section 208.10 at the request of the CVFPB. The Corps is also consulted prior to initiating formal actions.

If the Project alters a Federal flood control project by relocating or modifying an existing Federal project levee, the Corps approval under Section 14 of the RHA (33 USC 408, referred to as Section 408) or under Section 208.10 (33 CFR 208.10) is required prior to proceeding with the Project.

Section 10. Under RHA Section 10 (33 USC 403), the Corps regulates work in, over, or under; excavation of material from; or deposition of material into navigable waters. Structures or work outside the limits defined for navigable waters would require a Section 10 permit if the structure or work affects the course, location, condition, or capacity of the water body.

The jurisdiction of the Corps under CWA overlaps and extends beyond the geographic scope of its jurisdiction under the RHA. The Corps permitting authority under the RHA is not subject to EPA oversight or any other restrictions specific to the CWA and, in some cases, the RHA alone will apply to waters. A permit from the Corps is required prior to any work in, over, or under; excavation of material from, or deposition of material into, navigable waters.

The San Joaquin River is navigable for a length of 236 miles from its mouth to a point approximately 7 miles downstream from State Route (SR) 99, encompassing Reaches 1B downstream through Reach 5 and the San Joaquin River from the Merced River to the Delta. Restoration actions are proposed in the navigable Reaches 1B through 5 (inclusive of Reach 2B).

A Section 10 permit would be required prior to any activity that would alter these waters. Reclamation would apply for a Section 10 permit from the Corps' Sacramento District prior to construction, and that application would be processed simultaneously with the Section 404 CWA permit application. This EIS/R evaluates project-level environmental effects on waters of the United States, including navigable waters. This evaluation would be needed to support issuance of a Section 10 permit.

The proposed action would result in construction in, over, or under; excavation of material from; or deposition of material into "navigable waters," such as the San Joaquin River. As a result, the Project will require authorization from the Corps pursuant to Section 10 of the RHA (33 USC 403) for the construction of certain elements of the Project.

Reclamation and DWR consulted early in the planning process with the Corps regarding the Section 10 CWA compliance. Reclamation and CSLC have continued the consultation process. Before initiating any project-level actions that could result in discharge into jurisdictional features, Reclamation will apply for a Section 10 permit from the Corps.

Federal Endangered Species Act of 1973, as Amended

The Federal Endangered Species Act (ESA) (16 USC 1531 et seq.) is a mechanism for the protection and recovery of species threatened with extinction and includes, but is not limited to, the following:

- A process to list species in danger of becoming extinct (Section 4).
- A prohibition on "take" of threatened and endangered species (Section 9).
- Processes for exemption from Section 9 take prohibitions when take is incidental to, and not the purpose of, otherwise lawful activities (Section 7 and Section 10).

U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) share responsibility for regulatory implementation and enforcement of the ESA. USFWS has jurisdiction over non-anadromous freshwater fish, wildlife and plant species, and NMFS has jurisdiction over marine and anadromous species (e.g., Chinook salmon). Both agencies, upon request, evaluate the effects of proposed projects to determine if the proposed project will jeopardize the continued existence of a federally listed (threatened or endangered) species or adversely modify designated critical habitat.

Section 7 of the ESA outlines procedures for Federal interagency cooperation for implementation of the ESA. Section 7(a)(2) requires Federal agencies consult with USFWS and/or NMFS to ensure that "any action authorized, funded, or carried out by such agency" does not jeopardize the continued existence of a listed species or adversely modify designated critical habitat. Regulations jointly issued by USFWS and NMFS guide the consultation process.

When implementing Section 7(a)(2), there are three possible determinations that a Federal agency can make: No Effect, may affect but is Not Likely to Adversely Affect, and May Adversely Affect. If the Federal agency determines that the proposed action will have No Effect upon listed species or designated critical habitats, and documents a logical rationale and reasoning for that determination, then the agency's ESA compliance for that project is complete. If the agency makes a determination of Not Likely to Adversely Affect, then it must seek concurrence from USFWS and/or NMFS with that determination. Such determinations are made when the project is wholly beneficial to a listed species, or the anticipated effects are insignificant and/or discountable (not likely applicable for this proposed action). If the agency makes a May Adversely Affect determination, then it must enter into a formal consultation which usually concludes with the issuance of a Biological Opinion on whether the proposed activity will jeopardize the continued existence of a listed species. Under the ESA, an action is determined to jeopardize the continued existence of a species when it is reasonably expected, directly or indirectly, to diminish a species' numbers, reproduction, or distribution so that the likelihood of survival and recovery in the wild is appreciably reduced.

Section 9 of the ESA prohibits the "take" of federally listed species. Take is defined, under Section 3 of the ESA, as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Under Federal regulations, "take" is further defined to include habitat modification or degradation when it actually

results in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. A Biological Opinion issued under Section 7(a)(2) will include an Incidental Take Statement, which, among other purposes, when fully implemented, serves as a formal exemption to the Section 9 prohibition for that project.

Section 10 of the ESA addresses exceptions to the requirements found elsewhere in the ESA. Section 10(j) permits establishing and maintaining experimental populations. The Secretary of the Interior or the Secretary of Commerce may authorize the release (and related transportation) of any population (including eggs, propagates, or individuals) of an endangered or a threatened species outside the current range of such species, if the Secretary determines that such release would further the conservation of such species. Before authorizing the release of any experimental population, the Secretary must identify the population and determine, on the basis of the best available information, whether such a population is essential to the continued existence of an endangered or a threatened species.

Several species that are federally listed as threatened or endangered potentially occur in the Project area and implementation of the proposed action may result in adverse effects to these species or their habitat. Because the action is proposed by a Federal agency and requires Federal permits and approvals, and because Project implementation could adversely affect federally listed species, formal Section 7 consultation with USFWS and NMFS is required.

Reclamation and DWR coordinated with USFWS and NMFS early in the planning process to incorporate ESA Section 7(a)(2) consultation for the incidental take of listed species. Reclamation is continuing this process on an ongoing basis. An analysis of the anticipated effects of the proposed action upon listed species and designated critical habitats will be transmitted by Reclamation to USFWS and NMFS in a Biological Assessment. Depending on the level of potential effect, USFWS and NMFS will either provide concurrence or issue a Biological Opinion to address those actions. Reclamation will not initiate any action that would affect a species federally listed as endangered or threatened, without first completing the appropriate consultation(s) with USFWS or NMFS and receiving formal notice that the action would not jeopardize the continued existence of the listed species or adversely modify designated critical habitat.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) establishes a management system for national marine and estuarine fishery resources. The purpose of the MSFCMA is to take immediate action to conserve and manage the fishery resource off the United States coasts, and United States anadromous species, and promote the protection of Essential Fish Habitat (EFH). NMFS requires that Federal projects avoid adversely affecting EFH, as defined in the 1996 Sustainable Fisheries Act (Public Law 104-297), and to stop or reverse the continued loss of fish habitats through the goals of habitat protection, conservation, and enhancement.

This legislation requires that all Federal agencies consult with NMFS regarding actions or proposed actions permitted, funded, or undertaken that may adversely affect "essential fish habitat." EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The MSFCMA states that migratory routes to and from spawning grounds of anadromous fish are considered EFH. The phrase "adversely affect" refers to the creation of any impact that reduces the quality or quantity of EFH. Although the concept of EFH is similar to that of designated "critical habitat" under the ESA, measures recommended to protect EFH by NMFS are advisory, not prescriptive. Federal activities that occur outside EFH but that may, nonetheless, have an impact on waters and substrate constituting EFH must also be considered in the consultation process.

The MSFCMA requires all Federal agencies to consult with NMFS on activities or proposed activities that are authorized, funded, or undertaken by that agency that may adversely affect EFH. NMFS would then provide recommendations to conserve and reduce impacts to EFH. Federal agencies are required to respond to EFH conservation recommendations.

The MSFCMA states that consultation regarding EFH should be consolidated, where appropriate, with the interagency consultation, coordination, and environmental review procedures required by other Federal statutes, such as NEPA, Fish and Wildlife Coordination Act (FWCA), CWA, and ESA. Consultation requirements for EFH requirements can be satisfied through concurrent environmental compliance if the lead agency provides NMFS with timely notification of actions that may adversely affect EFH, and if the notification meets requirements for the EFH assessment.

Since the proposed action may have adverse effects to EFH, Reclamation will consult with NMFS under the MSFCMA. Project-level EFH consultation would be included with the consultation for Section 7 of the ESA.

Fish and Wildlife Coordination Act of 1934, as Amended

Coordination under the FWCA is intended to promote conservation of fish and wildlife resources by preventing their loss or damage and to provide for development and improvement of fish and wildlife resources in connection with water projects. Compliance with the FWCA involves assessing the impacts of the proposed action on preservation, conservation, and enhancement of fish and wildlife habitat. Reclamation will consider USFWS recommendations for preserving affected habitats, mitigating their loss, and enhancing such habitats, which may be provided by USFWS in a Fish and Wildlife Coordination Act Report. Documentation of compliance with the FWCA is a separate analysis of habitats of concern to USFWS, NMFS, and DFW, and does not replace the analysis required by Section 7 of the ESA.

Because the proposed action would affect surface waters, the FWCA is applicable. Program-level compliance with the FWCA was documented in the SJRRP programmatic Fish and Wildlife Coordination Act Report prepared by USFWS (SJRRP 2012a). Subsequent FWCA reporting may also occur for project-level actions.

Federal Clean Air Act of 1963, as Amended

The Federal Clean Air Act (CAA) was enacted to protect and enhance the Nation's air quality to promote public health and welfare and the productive capacity of the Nation's population. The CAA requires an evaluation of any Federal action to determine its potential impact on air quality in the project region. California has a corresponding law, which also must be considered during the preparation of the EIS/R. Most regulatory responsibilities under the CAA are delegated to State, regional, or local government bodies.

The CAA requires areas with unhealthy levels of ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and inhalable particulate matter to develop State Implementation Plans (SIPs) to comply with the national ambient air quality standards (42 USC 7410 et seq.). Federal agencies must conform to SIPs, meaning they must ensure that federally supported activities will not cause or contribute to a new violation, increase the severity of an existing violation, or delay timely attainment of any standard in any area (42 USC 7506(c)(1)(B)).

Proponents of specific projects must demonstrate that the actions will conform to the CAA and the SIP. A Federal action conforms with an applicable SIP if (1) the total of direct and indirect emissions from the action are compliant and consistent with the requirements of the SIP, and (2) one of a list of enumerated, pollutant-specific requirements is satisfied (such as accounting for the Federal action's projected emission of any criteria pollutant in the SIP, or offsetting ozone or nitrogen dioxide emissions within the nonattainment area) (42 CFR 93.158(a)). Ultimately, a conformity analysis may require revising a SIP, implementing mitigation measures to bring the Federal action's emissions levels down, or altering the action, possibly by reducing the magnitude of the action, to reduce emissions to levels within the budgets established by the SIP for specific pollutants.

Section 176 of the CAA prohibits Federal agencies from engaging in or supporting an action or activity that does not conform to an applicable SIP. Actions and activities must conform to a SIP's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards, and in attaining those standards expeditiously.

Any Federal agency providing financial assistance, issuing a license or permit, or approving or supporting in any way a proposed project located in a nonattainment or maintenance area for a criteria air pollutant is required to issue a conformity analysis. The conformity analysis must certify that the federally permitted project is consistent with the SIP developed pursuant to the CAA. A conformity analysis is required unless the proposed action's emissions are below the federally established *de minimis* emissions thresholds, and the proposed action's emissions do not reach the level of 10 percent or more of the regional emissions budget for any given pollutant in the nonattainment area. This is also applicable to short-term, construction-related emissions, and therefore applies to the Project.

A conformity analysis is typically performed concurrently with the permitting process of the Federal permit being sought. Project-level actions would conform with CAA and SIP as described in Chapter 4.0, "Air Quality."

Federal Water Project Recreation Act of 1965, as Amended

The Federal Water Project Recreation Act requires Federal agencies with authority to require water projects to include recreation development as a condition of approving permits. Recreation development must be considered along with any navigation, flood control, reclamation, hydroelectric, or multipurpose water resources project that affects water-related recreation on federally owned or operated land and waters. The Federal Water Project Recreation Act states that "full consideration shall be given to the opportunities, if any, which the project affords for outdoor recreation and for fish and wildlife enhancement and that, wherever any such project can reasonably serve either or both of these purposes consistently with the provisions of this Act, it shall be constructed, operated, and maintained accordingly." Planning for a project's recreation potential must be coordinated with existing and planned federal, state or local public recreation developments.

Compliance with the Federal Water Project Recreation Act is achieved through documented consideration of recreation opportunities in NEPA documents and is addressed in this EIS/R.

Safe Drinking Water Act of 1974, as Amended

The Safe Drinking Water Act mandates that EPA establishes regulations to protect human health from contaminants in drinking water. The law authorizes EPA to develop national drinking water standards and create a joint Federal-State/Tribal system for compliance with these standards. The Safe Drinking Water Act also directs EPA to protect underground sources of drinking water through the control of underground injection of liquid wastes.

EPA developed primary and secondary drinking water standards under the authority of the Safe Drinking Water Act. EPA and authorized states and tribes enforce the primary drinking water standards, which are contaminant-specific concentration limits that apply to certain public drinking water supplies. Primary drinking water standards consist of maximum contaminant-level goals, which are nonenforceable health-based goals, and maximum contaminant levels, which are enforceable limits set as close to maximum contaminant-level goals as possible, considering cost and feasibility of attainment.

Water used for domestic purposes is required to be treated by the local or regional water supply in accordance with Federal and State standards. Reclamation is in compliance with the Safe Drinking Water Act because implementing the Project would not change existing license requirements or impede enforcement of primary drinking water standards. Therefore, it is assumed no further analysis is needed for project-level actions.

National Historic Preservation Act of 1966, as Amended

Section 106 of the National Historic Preservation Act of 1966 and its implementing regulations (36 CFR Part 800, as amended) require Federal agencies to consider the

effects of their actions, or those they fund or permit, on properties that may be eligible for listing or are listed in the National Register of Historic Places (NRHP). The NRHP is a register of districts, sites, buildings, structures, and objects of significance in American history, architecture, archaeology, engineering, and culture.

During this process, the Federal agency is usually required to consult with the State Historic Preservation Officer (SHPO) and in some instances the Advisory Council on Historic Preservation, an independent Federal agency that advises the President and Congress on national historic preservation policy and administers the National Historic Preservation Act's Section 106 review process. The National Historic Preservation Act also requires that, in carrying out the requirements of Section 106, each Federal agency must consult with any Indian tribe that attaches religious and cultural significance to historic properties that may be affected by the agency's undertakings.

The proposed action would affect properties that are listed or eligible for listing on the NRHP (16 USC 470 as amended). Project-level actions could also result in the disturbance or destruction of cultural resources, as described in Chapter 9.0, "Cultural Resources." To mitigate these potential impacts, Reclamation will develop a Programmatic Agreement with the SHPO through the Section 106 consultation process.

Farmland Protection Policy Act of 1981

The Farmland Protection Policy Act requires that a Federal agency examine the potential impacts of a proposed action on prime and unique farmland, as defined by the Natural Resources Conservation Service and, if the action would adversely affect farmland preservation, consider alternatives to lessen the adverse effects. As a Federal agency preparing environmental compliance documents, Reclamation is required to conduct a farmland assessment designed to minimize adverse impacts on prime and unique farmlands and provide for mitigation**,** as appropriate.

This EIS/R evaluates the conversion of prime and unique farmland to other uses that would result from any project-level actions, as described in Chapter 16.0, "Land Use Planning and Agricultural Resources." Mitigation measures have been identified for farmland conversion, and include avoidance to the maximum amount practicable and feasible. Reclamation has demonstrated compliance with the Farmland Protection Policy Act through avoidance and mitigation for project-level actions.

Migratory Bird Treaty Act of 1918

The Migratory Bird Treaty Act (MBTA), first enacted in 1918, implements domestically a series of treaties between the United States, Great Britain (on behalf of Canada), Mexico, Japan, and the former Soviet Union, and provides for international migratory bird protection. The MBTA authorizes the Secretary of the Interior to regulate the taking of migratory birds; the act provides that it shall be unlawful, except as permitted by regulations, "to pursue, hunt, take, capture, kill, attempt to take, capture, or kill… any migratory bird, [or] any part, nest, or egg of any such bird …" (16 USC 703). This prohibition includes both direct and indirect actions, although harassment and habitat modification are not included unless they result in direct loss of birds, nests, or eggs. The current list of species protected by the MBTA includes several hundred species and

essentially all native birds. The act offers no statutory or regulatory mechanism for obtaining an incidental take permit for the loss of nongame migratory birds.

This EIS/R evaluates potential project-level impacts to migratory bird species and identifies conservation strategies to avoid direct and indirect take of birds, active nests, or eggs. Reclamation would comply with the MBTA through implementing the conservation strategies described herein before and during implementation of any project-level actions.

Executive Order 13186 (Migratory Birds)

EO 13186 directs Federal agencies to take certain actions to further implement the MBTA and outlines the responsibilities of Federal agencies to protect migratory birds. Specifically, this order directs Federal agencies with direct activities that will likely result in the take of migratory birds, to develop and implement a Memorandum of Understanding (MOU) with the USFWS that shall promote the conservation of migratory bird populations, with emphasis on species of concern. Reclamation has not finalized the MOU required in this order pending Department of Interior guidance. Reclamation has begun implementing the conservation measures set forth in this order, however, as appropriate and applicable.

Birds protected under the MBTA include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows, and others, including their body parts (feathers, plumes, etc.), nests, and eggs. A complete list of protected species is found at 50 CFR 10.13. Project activities that are most likely to result in take of migratory birds include, but are not limited to, clearing or grubbing of migratory bird nesting habitat during the nesting season when eggs or young are likely to be present. Efforts will be made to remove nesting habitat or inactive nests of migratory birds outside of the bird breeding season, and such activities will occur in coordination with the USFWS office with local jurisdiction.

Bald and Golden Eagle Protection Act

The Bald Eagle Protection Act (16 USC 668 668d, 54 Stat. 250) as amended, provides protection for the bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) by prohibiting the taking, possession, and commerce of such birds, their nests, eggs, or feathers unless expressly authorized by permit pursuant to Federal regulations. This EIS/R includes an environmental commitment to avoid and minimize effects to bald and golden eagles, as defined in the Bald and Golden Eagle Protection Act (see Conservation Measure EAGLE-1).

Indian Trust Assets

All Federal agencies have a responsibility to protect Indian Trust Assets. Indian Trust Assets are legal interests in assets held in trust by the Federal government for Native American tribes or individuals. Assets may be owned property, physical assets, intangible property rights, a lease, or the right to use something, and typically include lands, minerals, water rights, hunting and fishing rights, natural resources, money, or claims. If Indian Trust Assets are affected by the project-level actions, Reclamation would identify mitigation or compensation measures so that no net loss is incurred by the Native

American beneficial owners of the asset. As described in Section 3.3, project-level actions would not affect Indian Trust Assets.

Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act (25 USC 3001 to 3013) sets provisions for the removal and inadvertent discovery of human remains and other cultural items on Federal and tribal lands. The Native American Graves Protection and Repatriation Act clarifies the ownership of human remains and sets forth a process for repatriation of human remains and associated funerary objects and sacred religious objects to the Native American tribes or tribes likely to be lineal descendants or culturally affiliated with the discovered remains or objects.

Executive Order 11988 – Floodplain Management

EO 11988 is a flood hazard policy for all Federal agencies that manage Federal lands, sponsor Federal projects, or provide Federal funds to State or local projects. It requires that all Federal agencies take necessary action to reduce the risk of flood loss; restore and preserve the natural and beneficial values served by floodplains; and minimize the impacts of floods on human safety, health, and welfare. Specifically, EO 11988 dictates that all Federal agencies avoid construction or management practices that would adversely affect floodplains, unless an agency finds that no practical alternative exists and the proposed action has been designed or modified to minimize harm or risk to structures or facilities located within the floodplain.

This EIS/R evaluates potential project-level modifications to floodplains. The Project alternatives include commitments to minimize adverse effects to floodplains.

Executive Order 11990 – Protection of Wetlands

EO 11990 is an overall wetlands policy for all agencies that manage Federal lands, sponsor Federal projects, or provide Federal funds to State or local projects. This EO requires Federal agencies to follow avoidance, mitigation, and preservation procedures with public input before they propose new construction in wetlands. EO 11990 can restrict the sale of Federal land containing wetlands; however, it does not apply to Federal discretionary authority for non-Federal projects (other than funding) on non-Federal land.

This EIS/R evaluates potential impacts to wetlands from project-level actions. The alternatives include conservation measures which incorporate avoidance and preservation procedures, including restoration enhancement and replacement of wetlands.

Note that projects requiring compliance with EO 11990 are likely to require a permit under CWA Section 404 and the assessment of effects of the proposed action on wetlands is closely coordinated with the Section 404 process.

Executive Order 12898 – Environmental Justice in Minority and Low-Income Populations

EO 12898 requires Federal agencies to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies, and

activities on minority and low-income populations. These effects are to be considered in terms of both their frequency and magnitude. The requirements of EO 12898 apply to all Federal actions that are located on Federal lands, sponsored by a Federal agency, or funded with Federal monies, and that may affect minority or low-income populations.

To demonstrate compliance with EO 12898, the lead agency must show that it has considered the effects of the proposed action on minority and low-income populations and must design the proposed action to ensure that the action does not result, either directly or indirectly, in discrimination on the basis of race, color, or national origin. In all cases, the agency must undertake specific outreach to any identified minority and low-income populations. This outreach is to be specifically targeted to allow environmental justice populations to fully participate in the public involvement process.

This EIS/R evaluates whether the identified adverse human health and environmental effects from project-level actions would disproportionately affect minority and low-income populations. With publication of the socioeconomic analysis and environmental justice evaluations in this EIS/R, Reclamation solicits public comment and further inclusion of these populations in the planning process. Reclamation's compliance with EO 12898 has been accomplished thus far in the planning process and will continue through Project implementation.

Executive Order 13007 (Indian Sacred Sites) and April 29, 1994, Executive Memorandum

EO 13007 requires that Federal agencies with land management responsibilities accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners. This EO further requires that those agencies avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies also must maintain the confidentiality of sacred sites. Other requirements stipulate that the agencies provide reasonable notice of proposed actions or land management policies that may restrict future access to or ceremonial use of sacred sites, or that may adversely affect the physical integrity of sacred sites. The agencies must comply with the April 29, 1994, executive memorandum, "Government-to-Government Relations with Native American Tribal Governments."

Reclamation received information from Native American Heritage Commission about which Native American groups would be interested in Project actions. Reclamation mailed letters requesting their comments on November 30, 2010. Also, these Native American groups were notified of the public scoping meetings and are included in the distribution list for this EIS/R. Reaching out to Native American groups, including the groups that participated in scoping and review of this EIS/R, demonstrates that Reclamation has complied with EO 13007. If an Indian sacred site is encountered within the Project area, measures will be implemented to prevent any restriction of access or effect on the site's physical integrity. Continued compliance with this EO would be demonstrated through implementation of mitigation measures, as needed.

Executive Order 13112 – National Invasive Species Management Plan

EO 13112 directs all Federal agencies to prevent and control introductions of invasive nonnative species in a cost-effective and environmentally sound manner and to minimize economic, ecological, and human health impacts. EO 13112 established a national Invasive Species Council made up of Federal agencies and departments and a supporting Invasive Species Advisory Committee composed of State, local, and private entities. The Invasive Species Council and Advisory Committee oversee and facilitate implementation of the EO, including preparing a national management plan for invasive species.

An invasive species management plan is included in the PEIS/R and includes methods for managing the spread of invasive plant species from project and program-level actions. Project-level restoration activities and planning will be integrated with the programmatic invasive species management plan. Reclamation would demonstrate continued compliance with this EO by implementing the methods described in the invasive species management plan.

Federal Transit Administration

To address the human response to groundborne vibration, Federal Transit Administration (FTA) has set forth guidelines for criteria related to maximum acceptable vibration for different types of land uses. For frequent events, these include 65 vibration decibels (VdB) for land uses where low ambient vibration is essential for interior operations (e.g., hospitals, high-technology manufacturing, and laboratory facilities), 72 VdB for residential uses and buildings where people normally sleep, and 75 VdB for institutional land uses with primarily daytime operations (e.g., schools, churches, clinics, and offices) (FTA 2006).

Standards have also been established to address the potential for groundborne vibration to cause structural damage to buildings. These standards were developed by the Committee of Hearing, Bioacoustics, and Biomechanics at the request of EPA (FTA 2006). For fragile structures, the Committee of Hearing, Bioacoustics, and Biomechanics recommends a maximum limit of 0.25 in/sec peak particle velocity (FTA 2006). Peak particle velocity is a measure of the intensity of ground vibration, specifically the time rate of change of the amplitude of ground vibration.

This EIS/R evaluates potential groundborne vibration impacts on sensitive receptors, including the maximum sensitivity of 65 VdB described above. The rate of 65 VdB could be generated by pile-driving activities. Reclamation has demonstrated consistency with this policy by evaluating project-level actions that would generate the maximum possible groundborne vibration at the highest sensitive uses. Reclamation also has included mitigation measures to reduce the impact in accordance with this policy. Implementation of the mitigation measures would demonstrate that Reclamation would be consistent with the FTA policy for groundborne vibration.

National Wild and Scenic Rivers System

The National Wild and Scenic Rivers Act of 1968, as amended (Public Law 90-542; 16 USC 1271–1287), established the National Wild and Scenic Rivers System, which identifies distinguished rivers of the Nation that possess outstandingly remarkable scenic,

recreation, geologic, fish and wildlife, historic, cultural, or other related values. This act preserves the free-flowing condition of the rivers so designated and protects their local environments. Section 5(d)(1) of the act requires that all Federal agencies, when planning for the use and development of water and related land resources, shall consider potential national wild, scenic, and recreational river areas.

The San Joaquin River is not designated as a Wild and Scenic River in the Project area. Compliance with this law is not relevant to implementation of the Settlement.

U.S. Coast Guard

Under the General Bridge Act of 1946 and Section 9 of the RHA, the U.S. Coast Guard is responsible for approval of the location and plans of bridges and causeways constructed across navigable waters of the United States. In addition, the Coast Guard is responsible for approval of the location and plans of international bridges and the alteration of bridges found to be unreasonable obstructions to navigation. The purpose of regulating bridge construction under the General Bridge Act and Section 9 of the RHA is to preserve the public right of navigation and to prevent interference with interstate and foreign commerce. Project-level actions are not anticipated to affect the locations or plans of bridges or causeways constructed across navigable waters of the United States.

27.1.2 State Requirements

Compliance with State laws, rules, and regulations for implementation of the alternatives are summarized below.

California Environmental Quality Act

Prompted by the passage of NEPA in 1969, CEQA was signed into law in 1970 as California's counterpart to NEPA. CEQA is a statute that requires State and local agencies to identify the significant environmental impacts of their actions and avoid or mitigate those impacts, if feasible. The objectives of CEQA are to do all of the following:

- Disclose to decision-makers and the public the significant environmental effects of proposed activities.
- Identify ways to avoid or reduce environmental damage.
- Prevent environmental damage by requiring implementation of feasible alternatives or mitigation measures.
- Disclose to the public reasons for agency approval of projects with significant environmental effects.
- Foster interagency coordination in the review of projects.
- Enhance public participation in the planning process.

Depending on the potential impacts of a proposed project, environmental information is presented in one of three CEQA documents: a Notice of Exemption, an Initial Study supporting either a Negative Declaration or Mitigated Negative Declaration, or an Environmental Impact Report (EIR).

As NEPA and CEQA lead agencies, respectively, Reclamation and CSLC collaborated to prepare this joint EIS/R. Project-level actions are analyzed in this EIS/R at a project-specific level. This document identifies anticipated and probable significant effects of the project-level actions, as well as feasible mitigation measures. This document also compares No-Project (No Action) Alternative and project (action) alternatives to existing conditions to allow evaluation of their relative environmental consequences.

California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA) (Fish and G. Code, § 2050 et seq.), a permit from DFW may be required for projects that could result in the take of a plant or animal species that is State-listed as threatened, endangered or as a candidate species. Under CESA, the term “endangered species” is defined as a species of plant, fish, or wildlife that is “in serious danger of becoming extinct throughout all, or a significant portion of, its range” and is limited to species or subspecies native to California. Under CESA, “take” is defined as an activity that would directly or indirectly kill an individual of a species, but unlike the Federal ESA, the CESA definition of take does not include “harming” or “harassing.” Section 86 of the California Fish and Game Code defines take as to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

Sections 2080 and 2081 of the California Fish and Game Code cover the “take” of State threatened and endangered species. One of two CESA-compliance processes is generally followed when take of a State-listed species may occur, the Section 2080.1 consistency determination or Section 2081 incidental take permit processes. Section 2080.1 allows an applicant who has obtained a Federal incidental take statement through Section 7 consultation to request that DFW issue a consistency determination stating that the Federal document is “consistent” with CESA. A Section 2081 incidental take permit is used if agreement cannot be reached about consistency.

Several State-listed threatened or endangered species potentially occur in the Project area and particularly near the San Joaquin River and in adjacent waterways such as the Fresno Slough, Little San Joaquin Slough, and the Mendota Pool. Implementation of the proposed action may result in adverse effects to these species or their habitat. Reclamation has involved DFW at the early stages of planning to incorporate avoidance measures for State-listed species that may be affected.

California Fish and Game Code sections 3503 and 3503.5 state that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, and that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders *Falconiformes* and *Strigiformes),* including their nests or eggs. Typical violations of these codes include destruction of active nests resulting from removing vegetation in which the nests are located. Violation of section 3503.5 could also include failure of active raptor nests resulting from disturbance of nesting pairs by nearby project construction. This statute does not provide for issuing any type of incidental take permit.

This document identifies actions that would potentially disturb nesting birds. To comply with sections 3503 and 3503.5, this EIS/R describes conservation strategies to avoid

disturbing nesting birds per the requirements in the SJRRP 2012 Record of Decision (SJRRP 2012b). These measures include conducting preconstruction surveys, ceasing vegetation removal activities if the vegetation is occupied by active nests, and establishing environmentally sensitive areas around nesting birds to minimize construction disturbance of any nesting pair, and to avoid forced fledging.

California Fish and Game Code – Fully Protected Species

Protection of fully protected species is described in Fish and Game Code sections 3511, 4700, 5050, and 5515. These statutes prohibit take or possession of fully protected species. DFW is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by those species. Reclamation and CSLC are working closely with DFW to evaluate methods to avoid take of fully protected species.

This EIS/R evaluates potential project-level effects to blunt-nosed leopard lizard, a fully protected species. The Project alternatives include environmental commitments for this species (see Conservation Measures BNLL-1 and BNLL-2). These conservation measures are designed to avoid any direct take of blunt-nosed leopard lizards.

California Fish and Game Code Section 1602 – Streambed Alteration

Diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by DFW under Fish and Game Code section 1602. Under section 1602, as applicable, it is unlawful for any person, governmental agency, or public utility to do the following without first notifying DFW:

> *…substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.*

A stream is defined as a body of water that flows at least periodically or intermittently through a bed or channel that has banks and supports fish or other aquatic life. This definition includes watercourses with a surface or subsurface flow that supports or has supported riparian vegetation. DFW's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. As applicable, a DFW streambed alteration agreement is obtained for any project that would result in an impact on a river, stream, or lake.

This EIS/R identifies potential project-level actions that would alter stream features subject to Fish and Game Code section 1602. The proposed action will substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of a river, stream, or lake or use materials from a streambed. Project proponents will, if appropriate, apply for a Streambed Alteration Agreement from DFW.

Central Valley Flood Control Act of 2008

In 2007, the Governor signed five interrelated bills (flood legislation) aimed at addressing the problems of flood protection and liability and helping to direct use of the voter-approved bond funds provided by 2006 Propositions 1E and 84. These included Senate Bill (SB) 5 and 17, and Assembly Bills (AB) 5, 70, and 156. A sixth bill passed in 2007, AB 162, required additional consideration of flood risk in local land use planning throughout California. These bills, effective January 1, 2008, collectively added or amended sections in the California Government Code, Health and Safety Code, Public Resources Code, and California Water Code. Together, these bills outline a comprehensive approach to improving flood management at the State and local levels, with elements to address both the chance of flooding and the consequences when flooding does occur.

The major piece of the flood legislation is the Central Valley Flood Protection Act of 2008, enacted by SB 5. This legislation seeks to address flood management problems in the Sacramento-San Joaquin Valley by directing DWR to prepare a Central Valley Flood Protection Plan by mid-2012 for adoption by the CVFPB. The Central Valley Flood Protection Plan is intended to establish a system-wide approach to improving flood management in areas currently receiving some amount of flood protection from existing facilities of the Federal-State flood management system. The flood legislation also establishes the 200-year flood event (flood with a 1-in-200 chance of occurring in any year) as the minimum level of flood protection to be provided in urban and urbanizing areas in the Sacramento-San Joaquin Valley.

The flood legislation also requires DWR and the CVFPB to adopt a schedule for mapping flood risk areas in the Central Valley, and sets deadlines for cities and counties in the Central Valley to amend their general plans and zoning ordinances to conform to the Central Valley Flood Protection Plan within 24 months and 36 months, respectively, of its adoption by the CVFPB. Once the general plan and zoning ordinance amendments are enacted, the approval of development agreements and subdivision maps is subject to restrictions in flood hazard zones. Central Valley counties are obligated to develop flood emergency plans within 24 months of CVFPB adoption.

Reclamation and CSLC have jointly developed the proposed action in a manner that is consistent with the Central Valley Flood Control Act**,** and which would not inhibit development of the Central Valley Flood Protection Plan.

Central Valley Flood Protection Board Encroachment Permit

Under Title 23 of the California Code of Regulations, the CVFPB issues encroachment permits to maintain the integrity and safety of flood control project levees and floodways that were constructed according to flood control plans adopted by CVFPB or the California Legislature. The CVFPB has jurisdiction over the levee section, the waterward area between project levees, a 10-foot-wide strip adjacent to the landward levee toe, within 30 feet of the top of the banks of unleveed project channels, and within designated floodways adopted by the CVFPB. Activities outside of these limits that could adversely affect the flood control project also fall under the jurisdiction of the CVFPB. In accordance with the provisions of Title 33, CFR Section 208.10, all permit requests for

construction of improvements of any nature within the limits of a Federal project right-of-way would be referred to the Corps District Engineer for review.

Project-level actions will require work along the San Joaquin River in areas that may be subject to Title 23 because the river is managed for flood control and thus contains features subject to the jurisdiction of CVFPB. The San Joaquin River is a regulated stream and the proposed action could have an effect on the flood control functions of project levees just east and north of the Chowchilla Bifurcation Structure or downstream project levees. Project proponents will complete an encroachment permit application, as needed, before performing any work along relevant reaches of the San Joaquin River that contain flood control features subject to CVFPB jurisdiction.

California Water Code (Water Rights)

A water right is a legally protected right, granted by law, to take control of water and to put it to beneficial use. Under the California Water Code, the SWRCB is responsible for allocating surface water rights and permitting the diversion and use of water throughout the State. Through its Division of Water Rights, the SWRCB issues permits to store and to divert water for new appropriations and it authorizes changes to existing water rights. SWRCB attaches conditions to these permits to ensure that the water user prevents waste, conserves water, does not infringe on the rights of others, and puts the State's water resources to the most beneficial use.

An applicant, permittee, or licensee who wishes to change the point of diversion, place of use, or purpose of use from that specified in an existing permit or license must petition SWRCB to amend a water right. When considering a petition for a water right amendment, SWRCB considers the same factors as those it considers when a water user applies for a new permit, such as waste prevention, water conservation, infringement on the rights of others, and public trust values.

Reclamation has filed petitions with the SWRCB for changes to its San Joaquin River water rights permits and license to facilitate Program-level activities implementing the SJRRP. Those petitions have already been approved. If Project actions require Reclamation to request changes to its San Joaquin River water right permits, Reclamation will review any comments submitted by the SWRCB on this EIS/R and would coordinate with the SWRCB regarding this matter. If the SWRCB determines that the Project requires changes to its San Joaquin River water rights permits, Reclamation would file the appropriate petitions with the SWRCB. Any other entities claiming pre-1914 appropriative rights, for which changes to water rights are determined necessary, would make those changes pursuant to California Water Code section 1706.

California Wild and Scenic Rivers Act

The California Wild and Scenic Rivers Act of 1972, as amended (Pub. Resources Code, § 5093.50 et seq.), aims to preserve designated rivers possessing extraordinary scenic, recreation, fishery, or wildlife values. Implementation of the Project alternatives would not affect any State-designated wild and scenic river.

California Harbors and Navigation Code

The California Harbors and Navigation Code details the jurisdictions of the California Department of Parks and Recreation, Division of Boating and Waterways, which focus development of public access to waterways, safety of vessels and boating facilities, and on-the-water safety. Coordination with the Division of Boating and Waterways regarding design standards for future boating facilities could be required for installing new or modifying existing boating facilities, such as boat ramps, docks, or marinas.

Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Water Quality Control Act, "waters of the State" fall under the jurisdiction of the appropriate RWQCB (in this case, the Central Valley RWQCB). Under the act, the appropriate RWQCB must prepare and periodically update water quality control basin plans. Each basin plan sets forth water quality standards for surface water and groundwater, as well as actions to control point and nonpoint sources of pollution to achieve and maintain these standards. Projects that affect wetlands or waters of the State must meet the RWQCB's waste discharge requirements, which may be issued in addition to a water quality certification under Section 401 of the CWA. Waters of the State are defined as "any surface water or groundwater, including saline waters, within the boundaries of the State (Wat. Code, § 13050, subd. (e)) which include all waters within the State's boundaries, whether private or public, including waters in both natural and artificial channels."

Project-level actions that have the potential to adversely affect water quality are identified in this document. Actions would be implemented consistent with implementation programs under the water quality control plan for the Sacramento River and San Joaquin River basins, as revised (Central Valley RWQCB 2011), and with the RWQCB's waste discharge requirements. Implementing some Project-level actions would include application for NPDES permits and a Section 401 water quality certification.

California Land Conservation Act of 1965 (Williamson Act)

The California Land Conservation Act of 1965 (Gov. Code, § 51200 et seq.), commonly known as the Williamson Act, is the principal method for encouraging the preservation of agricultural lands in California. The Williamson Act enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use for 10 years. In return, landowners receive property tax assessments based on farming and open space uses as opposed to full market value. Local governments receive an annual subvention (subsidy) of forgone property tax revenues from the State via the Open Space Subvention Act of 1971.

The Williamson Act empowers local governments to establish "agricultural preserves" consisting of lands devoted to agricultural and other compatible uses. On establishment of such preserves, the locality may offer to owners of included agricultural land the opportunity to enter into annually renewable contracts that restrict the land for at least 10 years. In return, the landowner is guaranteed a relatively stable tax base, founded on the value of the land for agricultural/open space use only, and unaffected by its development potential.

Williamson Act contracts are for 10 years and longer. The contract is renewed automatically each year, maintaining a constant, 10-year contract, unless the landowner or local government files to initiate nonrenewal. Should that occur, the Williamson Act would terminate 9 years after the filing of a notice of nonrenewal.

Because a public agency would acquire lands within agricultural preserves, including lands under contract, the Project is exempt from the normal cancellation process for Williamson Act contracts. This is because the contract is nullified for the portion of the land actually acquired by a public agency (Gov. Code, § 51295). The lead agency must provide notice to the California Department of Conservation (DOC) before acquiring such lands (Gov. Code § 51291, subd. (b)). A second notice is required within 10 working days after the land is actually acquired (Gov. Code, § 51291, subd. (c)). The lead agency would be exempt from the findings required in California Government Code section 51292 (Gov. Code, § 51293, subd. (e)(2)) for the acquisition of lands under Williamson Act contracts. Preliminary notice to DOC, provided before lands are actually acquired, would demonstrate the purpose of the project and exemption from the findings. DOC was provided a copy of this EIS/R, along with a request for comments.

Project-level actions would result in the need to acquire Important Farmland including lands under Williamson Act contracts. The extent of lands that could be affected due to proposed actions is described in Chapter 16.0, “Land Use Planning and Agricultural Resources.”

California Clean Air Act

The California Clean Air Act (CCAA) of 1988 requires nonattainment areas, such as the San Joaquin Valley Air Basin, to achieve and maintain State ambient air quality standards by the earliest practicable date. The CCAA also requires local air districts to develop plans for attaining State ozone, carbon monoxide, sulfur dioxide, and nitrogen dioxide standards. The San Joaquin Valley Air Pollution Control District (SJVAPCD) has the authority to issue permits and ensure compliance with air quality regulations in the Project area, as appropriate.

The SJVAPCD is required by the CCAA to develop "indirect source" control programs in their attainment plans. The SJVAPCD is committed to reducing PM_{10} and nitrous oxides emissions from indirect sources in the 2003 PM_{10} Plan and the 2004 Extreme Ozone Attainment Demonstration Plan. The SJVAPCD’s Governing Board adopted District Rule 9510 as a result of this commitment. In accordance with SJVAPCD Rule 9510, Indirect Source Review, applicants mitigate project impacts through the incorporation of on-site emission reducing design elements and/or the payment of fees that would be used to fund off-site emissions reduction projects.

In accordance with SJVAPCD Rule 8021 – Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities, the owner or operator of a construction project would submit a dust control plan to SJVAPCD if at any time the project would involve:

- Residential developments of 10 or more acres of disturbed surface area.
- Nonresidential developments of 5 or more acres of disturbed surface area.
- Moving, depositing, or relocating of more than 2,500 cubic yards per day of bulk materials on at least 3 days of the project.

A dust control plan identifies the fugitive dust sources at the construction site and describes the dust control measures to be implemented before, during, and after any dust-generating activity for the duration of the project. The owner or operator would comply with applicable rules under Regulation VIII.

This EIS/R evaluates the contribution of project-level actions to any violation of air quality standards and identifies mitigation measures to help achieve consistency with the SIP attainment goal before implementation of project-level actions.

Finally, because the proposed action would likely involve the construction of a nonresidential development of more than 5 acres of disturbed surface area and could involve moving, depositing, or relocating more than 2,500 cubic yards per day of bulk materials on at least 3 days, a dust control plan is required. Construction activities would not commence until the dust control plan has been approved or conditionally approved by the SJVAPCD.

Executive Order B-30-15

EO B-30-15 was signed by Governor Brown in April 2015. This EO establishes a California greenhouse gas reduction target of 40 percent below 1990 levels by 2030. This target is in line with levels needed in the U.S. to limit global warming below 2 degrees Celsius and will also facilitate reaching the ultimate goal of reducing emissions 80 percent under 1990 levels by 2050. The EO also specifically addresses the need for climate adaptation and directs State government to factor climate change into State agencies' planning decisions and to implement measures under existing agency and departmental authority to reduce greenhouse gas emissions.

This EIS/R evaluates project-level effect to climate change and greenhouse gas emissions. Implementation of mitigation measures for air quality would also result in GHG emission co-benefits and further reduce GHG emissions.

California Native Plant Protection Act

The California Native Plant Protection Act of 1977 (Fish and G. Code, §§1900 – 1913) establishes criteria for the preservation, protection, and enhancement of endangered or rare native plants of the State. This act requires all State agencies to use their authority to carry out programs to conserve endangered and rare native plants. The California Native Plant Protection Act provides protection to “endangered” and “rare” plant species, subspecies, and varieties of wild native plants in California. The California Native Plant Protection Act’s definitions of “endangered” and “rare” closely parallel the CESA definitions of endangered and threatened plant species. All project-level actions are evaluated in this EIS/R for consistency with this act.

California Native Plant Society Species Designations

California Native Plant Society (CNPS) is a statewide nonprofit organization that seeks to increase understanding of California's native flora, and to preserve this rich resource for future generations. CNPS has developed and maintains lists of vascular plants of special concern in California. CNPS-listed species have no formal legal protection, but the value and importance of these lists are widely recognized. CNPS List 1 and 2 species are considered rare plants pursuant to section 15380 of CEQA, and it is recommended that they be fully considered while preparing environmental documents relating to CEQA. This EIS/R identifies plants of concern on CNPS lists that may be affected by project-level actions, using these lists as a method of identifying species of concern.

State Lands Commission Land Use Lease

The CSLC was given authority and responsibility to manage and protect the important natural and cultural resources on certain public lands within the State, and the public's rights to access these lands. The public lands under the commission's jurisdiction are of two distinct types: sovereign lands and school lands. Sovereign lands encompass approximately 4 million acres. These lands include the beds of California's naturally navigable rivers, lakes, and streams, as well as the State's tidal and submerged lands along the coastline, extending from the shoreline to 3 nautical miles offshore. A project cannot use these State lands unless a lease is first obtained from the CSLC.

The San Joaquin River is defined as "navigable in fact" from its mouth upstream to Friant Dam near Fresno, and is therefore subject to the jurisdiction of the CSLC. Project-level actions that require work on the San Joaquin River would require a lease from the CSLC.

California Department of Transportation

California Department of Transportation (Caltrans) is responsible for planning, designing, construction, operating, and maintaining all State-owned roadways in California. The Caltrans Highway Design Manual (2013a) establishes uniform policies and procedures to carry out the Caltrans highway design functions. The highway design criteria and policies in the manual provide a guide for applying standards in the design of projects and, rather than implementing enforceable regulations, present information and guidance.

Highway improvements or modifications, as may be needed for implementation of this project, may require an encroachment permit as issued through Caltrans. The project may involve modifications to roadways that Caltrans considers "complex" and require extensive communication with the Caltrans Department of Engineering Services or structure-specific encroachment permits. These are detailed in the Caltrans Encroachment Permits Manual (2013b), which is available at the Caltrans website. Any improvements to roadways subject to Caltrans jurisdiction would be subject to Caltrans design standards, which would include standards for protecting cultural resources and structures.

Project-level actions may require improving or modifying roadways subject to Caltrans jurisdiction. SR 30 and SR 180 are located within the Project area and are addressed in a regional roadway traffic analysis completed for the Project. The analysis found that Project construction would not affect existing levels of service on these routes.

California Public Resources Code

The Public Resources Code contains several sections relevant to the project. Some examples include the California Park and Recreational Facilities Act of 1984 (§ 5096.225) and the Federal Water Project Recreation Act (§ 5094). Compliance with these acts is achieved by analyzing in this EIS/R (Chapter 20.0, "Recreation") the impact of project-level actions on recreation opportunities.

California Surface Mining and Reclamation Act

The California Surface Mining and Reclamation Act of 1975 (SMARA) (Pub. Resources Code, § 2710 et seq.) addresses surface mining. Activities subject to SMARA include, but are not limited to mining of minerals, gravel, and borrow material. SMARA applies to an individual or entity that would disturb more than 1 acre or remove more than 1,000 cubic yards of material through surface mining activities, including the excavation of borrow pits for soil material. The SMARA statute requires mitigation to reduce adverse impacts on public health, property, and the environment and requires that mined lands are reclaimed to a usable condition. SMARA also encourages the production, conservation, and protection of the State's mineral resources.

SMARA is implemented through ordinances for permitting developed by local-government lead agencies that provide the regulatory framework under which local mining and reclamation activities are conducted. The State Mining and Geology Board of reviews the local ordinances compliance with the procedures established by SMARA.

In general, SMARA permitting requires the lead agency to approve a permit and reclamation plan, and post approved financial assurance for reclamation of the mined land. Compliance with reclamation plans may include, but is not limited to, revegetation and landscaping requirements, restoration of aquatic or wildlife habitat, restoration of water bodies and water quality, slope stability and erosion and drainage control, disposal of hazardous materials, and other measures, if necessary.

This EIS/R analyzes anticipated impacts of project-level actions, including impacts associated with removing borrow material. The project proponent will comply with SMARA where appropriate. Reclamation has invited Fresno and Madera counties to be cooperating agencies on this Project.

California Register of Historical Resources

Public Resources Code section 5024.1 establishes the California Register of Historical Resources (CRHR). The CRHR lists all properties considered to be significant historical resources in the State. The CRHR includes all properties listed or determined eligible for listing on the NRHP, including properties evaluated under Section 106. The criteria for listing are similar as those of the NRHP. CEQA section 21084.1 requires a finding of significance for substantial adverse changes to historical resources and defines the term "historical resources." CEQA section 21083.2 and State CEQA Guidelines section 15064.5, subdivision (c) provide further definitions and guidance for archaeological sites and their treatment. The lead agency is required to follow the established guidelines during the CEQA process and is addressed in this EIS/R.

California Native American Graves Protection and Repatriation Act

The California Native American Graves Protection and Repatriation Act (Health & Saf. Code, § 8010 et seq.) establishes a State repatriation policy intent that is consistent with and facilitates implementation of the Federal Native American Graves Protection and Repatriation Act. The act strives to ensure that all California Indian human remains and cultural items are treated with dignity and respect, and encourages voluntary disclosure and return of remains and cultural items by publicly funded agencies in California. If human remains are encountered during Project construction, Reclamation will comply with applicable laws and regulations regarding notification and disposition of the remains.

Executive Order B-10-11

EO B-10-11 was signed by Governor Brown on September 9, 2011. This EO establishes the role and responsibilities of the Governor's Tribal Advisor and directs State agencies and departments under the Governor's executive control to communicate and consult with Federally recognized tribes, other California Native Americans, and representatives of tribal governments to provide meaningful input into the development of legislation, regulations, rules, and policies on matters that may affect tribal communities.

Assembly Bill 52

AB 52, signed on September 25, 2014, amends CEQA, creates a new category of environmental resources: "tribal cultural resources," and imposes new requirements for consultation for projects that may affect a tribal cultural resources (Public Resources Code sections 5097.94, 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2, and 21084.3).

Reclamation received information from Native American Heritage Commission about which Native American groups would be interested in Project actions. Reclamation mailed letters requesting their comments on November 30, 2010. Also, these Native American groups were notified of the public scoping meetings and are included in the distribution list for this EIS/R. Reaching out to Native American groups, including the groups that participated in scoping and review of this EIS/R, demonstrates compliance with this EO B-10-11 and AB 52.

27.1.3 Local Plans and Policies

This EIS/R analyzes alternatives for consistency with the general plan policies of the relevant counties and cities. These jurisdictions include the counties of Fresno and Madera and the cities of Mendota and Firebaugh. Compliance with local plans and polices for implementation of the alternatives is summarized below.

California Government Code General Plan Requirement

Government Code section 65300 et seq. requires California cities and counties to adopt and implement general plans. A general plan is a comprehensive, long-term strategy document that sets forth the expected location and general type of physical development expected in the city or county preparing the document. The general plan also may consider land outside its boundaries that, in the city's or county's judgment, may affect land use activities within its borders. The general plan addresses a broad range of topics,

including, at a minimum, land use, circulation, housing, conservation, open space, noise, and safety. In addressing these topics, the general plan identifies goals, objectives, policies, principles, standards, and plan proposals that support the city's or county's vision for the area. The general plan is a long-range document that typically addresses development over a 20-year period.

Reclamation would notify the counties of Fresno and Madera, and their respective planning and public works departments, of any inconsistencies with local plans and ordinances, such as County general plans, zoning ordinances, grading requirements, and various use permits. Each county would determine the need for potential changes to the affected parcels' land use designations and the applicable zoning categories (for implementing the land use designations) as well as the need for a general plan amendment if there is a conflict between existing and proposed land uses.

27.2 Consultation and Coordination

Consultation and coordination for the Project included project scoping and consultation with agencies and organizations, as described in the following sections. Future consultation and coordination are also described in this section.

27.2.1 Project Scoping

Public scoping activities are conducted as part of compliance with both NEPA and CEQA. The scoping process helps to identify areas to be studied and to eliminate issues from detailed study that are not critical to the decision at hand. Additional information on Project scoping is discussed in the Public Scoping Report (SJRRP 2010).

Notice of Intent

Reclamation published the Notice of Intent to prepare an EIS/R in the Federal Register (Vol. 74, No. 132, Monday July 13, 2009), as required by NEPA. The Notice of Intent is available at www.restoresjr.net.

Notice of Preparation

DWR initiated the CEQA process by issuing a Notice of Preparation on July 13, 2009, and the Project was assigned State Clearinghouse Number 2009072044. The Notice of Preparation is available at w*ww.restoresjr.net*. Although initial CEQA actions were conducted by DWR, subsequent actions during the EIS/R process have been conducted by the CSLC as the State lead agency.

Public Scoping Meetings

Reclamation and DWR held two public scoping meetings in July 2009, regarding preparation of an EIS/R for the Project. The first meeting was held in Fresno, California, on Tuesday, July 28, 2009, from 6:00 p.m. to 8:00 p.m. The second meeting took place in Firebaugh, California, on Wednesday, July 29, 2009, from 6:00 p.m. to 8:00 p.m. The location of the July 29, 2009 scoping meeting in Firebaugh was changed the morning of the meeting to accommodate an anticipated increase in audience numbers based on the preceding evening's scoping meeting in Fresno. The venue was moved from the

Firebaugh Community Center to the Firebaugh Middle School, a distance of about 0.5 mile. An email was sent at 1:30 p.m. to two primary stakeholder groups informing them of the change of location. They, in turn, sent notifications to their members which reached almost all of the evening's attendees. Additionally, a scoping meeting staff person remained at the original location to direct people to the new location. Approximately 130 people attended the two meetings, including members of the public, landowners, elected officials, and representatives from public agencies.

To publicize the meetings, the lead agencies distributed notices (including a copy of the Notice of Intent and Notice of Preparation) to approximately 960 interested parties in the Project mailing list database, including Federal, State, and local agencies, elected officials, irrigation districts, county planning departments, landowners, academics, and other individuals that have shown an interest in the Project. A certified mailing was sent out to specific State, Federal, and local agencies to meet CEQA requirements.

Print ads displaying the time, date, and location of the scoping meetings were published in local area newspapers including the main sections of the *Fresno Bee* (July 15), *Visalia Times-Delta* (July 15), *Firebaugh-Mendota Journal* (July 15), *Merced Sun-Star* (July 15), and *Los Banos Enterprise* (July 17).

A press release was distributed by Reclamation on July 13, 2009, to Reclamation's media lists, other newspapers and media outlets in the Reach 2B area (both English- and Spanish-speaking), Farm Bureau publications for the counties of Fresno, Merced, and Madera, the California Farm Bureau Federation's "Ag Alert" weekly newspaper, the California Farmer, and the Capitol Press. Updated information on the scoping meetings was also posted to the SJRRP website (www.restoresjr.net).

Meeting participants were greeted at the door and asked to sign in. All names were entered into a database for the exclusive purpose of keeping participants up-to-date on future activities, meetings, and Project information. Meeting materials available to participants included:

- Agenda.
- PowerPoint presentation.
- Project press release.
- Spanish translation of the project press release.
- Notice of Intent and Notice of Preparation.
- SJRRP Update Newsletter.
- Speaker card.
- Comment card with an area map.

Both public meetings began with a PowerPoint presentation by Reclamation and DWR. The presentation explained the purpose of the meeting, provided a history of the Settlement, presented an overview of the key components of the Project, and described the public scoping process. Following the presentation, participants were able to walk

around the room and discuss the project with Program staff members for the "open house" portion of the meeting. Three stations with displays were set up and included:

- Project Process and Timeline.
- Project Information.
- Comments and Public Involvement.

A staff person was available to each station to talk with the public and answer questions related to the project or overall Program. A Spanish-speaking interpreter was present at both meetings.

Verbal and written comments were accepted by Reclamation and DWR during both scoping meetings. A public comment session was held after the open house portion of the meeting. Meeting participants were invited to provide verbal and written comments. Participants were invited to submit written comments on the provided comment cards and attached map. A court reporter attended both meetings to record all verbal comments. Twelve verbal public comments were made at the Fresno scoping meeting, and ten verbal comments were made at the Firebaugh scoping meeting.

Additionally, the agencies accepted written comments through mail, e- mail, and fax, throughout the scoping period of July 13, 2009, through August 14, 2009. A total of 21 written documents were received and 11 participants provided verbal comments during the scoping period.

The agencies, individuals, and nongovernmental organizations that provided comments are presented in Table 27-2 and Table 27-3, respectively. Subsequent CEQA actions during the EIS/R process have been conducted by the CSLC as the State lead agency.

Table 27-1
List of Public Agencies That Provided Comments

Public Agencies	Comment Type
Federal	
U.S. Department of the Army, Corps of Engineers, California South Branch – Paul Maniccia, Chief	Written
U.S. Environmental Protection Agency, Communities and Ecosystems Division, Environmental Review Office – Kathleen M. Goforth, Manager	Written
State	
California State Lands Commission – Marina R. Brand, Assistant Chief, Division of Environmental Planning and Management	Written
San Joaquin Valley Air Pollution Control District – Arnaud Marjollet, Permit Services Manager	Written
Regional and Local	
Central California Irrigation District – Chris White, General Manager	Verbal
City of Firebaugh – Jose Ramirez, City Manager	Verbal
Grassland Water District – David Widell, General Manger	Written
Mendota City Council – S. Les Capuchio	Written

Table 27-1
List of Public Agencies That Provided Comments

Public Agencies	Comment Type
Mendota Planning Commission – Ed Petry	Written
San Joaquin River Resource Management Coalition and San Joaquin River Exchange Contractors Water Authority – Mari Martin, RMC, and Steve Chedester, SJRECWA	Written and Verbal
San Joaquin River Exchange Contractors Water Authority – Steve Chedester, Executive Director	Written

Table 27-2
List of Individuals and Nongovernmental Organizations that Provided Comments

Individuals and Nongovernmental Organizations	Comment Type
1986 Mitigation Lands Trust – Steven Haugen, Trustee	Written
Bart Bohn, Fresno, CA	Written
Bill Ward, BB Limited, Landowner	Verbal
Carl Janzen, Madera, CA	Written
Chris Acree, Revive the San Joaquin	Verbal
Columbia Canal Company – Roy Catania and Chris Cardella	Verbal
Columbia Canal Company – Randy Houk, General Manager	Written
Donna Duckworth, Fresno, CA	Written
Ed Howard, Fresno, CA	Written
Fresno County Farm Bureau - Ryan Jacobsen, Executive Director	Written
Ken Samarin, Samarian Farms, Kerman	Verbal
Oscar and Marcia Sablan, Firebaugh, CA	Written
Paramount Farming Company – Mike Widhalm & Kimberly Brown	Written and Verbal
Richard Knight, Fresno, CA	Written
Rudolfo Rulloda	Written
San Luis Canal Company – Chase Hurley, General Manager	Written
Sandra Flores, Fresno Regional Foundation, Sr. Program Officer	Verbal
Walter Shubin, Individual, Kerman	Verbal

Other Public Outreach

Reclamation and DWR conducted the following additional public outreach activities since the scoping meetings:

- Issued public scoping report in February 2010 (SJRRP 2010).
- Requested comments on the Project from Native American groups identified by the Native American Heritage Commission on November 30, 2010.
- Hosted regularly scheduled technical feedback meetings with subject-matter experts, Settling Parties, affected stakeholders, and the general public to obtain information or viewpoints from individual attendees.

- Gathered feedback on Project documents to discuss potential opportunities and constraints that may have arisen.
- Developed and distributed a wide variety of Project information, including quarterly program updates, two annual reports, news releases, fact sheets, and brochures to keep the public informed.
- Developed a process and form for obtaining landowner permission for temporary access to private property in support of field surveys.
- Established a landowner coordinator to serve as a technical resource and liaison for program staff and landowners to conduct all field activities necessary for successfully implementing the Settlement, and to inform potentially affected property owners of field activities on their land.
- The Reach 2B floodplain pre-appraisal level themes and Mendota Pool Bypass alignments were presented by DWR at the November 17, 2009, meeting.
- Project status updates, overview of the publically available project-specific documents, concept refinement of the San Mateo Avenue crossing design and use of Little San Joaquin Slough, and the alternatives development process were presented and discussed, and comments were accepted at the May 27, 2010. meeting.
- Project status updates, overview of new publically available project-specific documents, and DWR's land acquisitions process were presented and discussed, and comments were accepted at the March 24, 2011, meeting.
- The CSLC draft administrative maps for Reach 2B, a brief Program update, and a Project update were presented at the October 3, 2011, meeting.
- The Project effects on Mendota Pool and other operations, details of Project components, and effects on infrastructure using large-scale maps were presented at the November 14, 2011, workshop.
- Overview of borrow material needs and the status of geotechnical explorations was presented during the December 16, 2011, conference call.
- Project overview, status, and a brief review of the alternatives were presented to stakeholders associated with Fresno Slough at the May 31, 2012, meeting.
- A meeting was held on January 29, 2013, to introduce the consensus-based alternative concept and approach to the adjacent landowners, canal companies, irrigation districts, levee districts, cities, and the Settling Parties. The consensus-based alternative approach gives these entities the opportunity to provide input on the Project course of action, and their input will be considered during the selection of a preferred alternative.
- In addition, many calls and emails were exchanged with individual landowners to discuss specific issues.

Engagement of local governments, nongovernmental organizations, and individuals, as well as coordination between the SJRRP and agencies, has been and continues to be facilitated through SJRRP Work Groups. Continuation of scheduled meetings and open

sharing of information via the SJRRP website are evidence of this commitment. MOUs were prepared, as required, for cooperating agencies under NEPA, and continued collaboration with responsible agencies, especially those with a trust responsibility, is a goal and commitment of the SJRRP (see Section 27.3.2 regarding the role of cooperating and responsible agencies). Continued involvement and open sharing of information through the SJRRP website show that the comments raised regarding public outreach are recognized. The need to balance open sharing of information with adherence to agency responsibilities will continue to be a goal.

Public Issues and Major Areas of Controversy

A public scoping report dated February 2010, summarizes the results of the scoping meetings and comments received), and is available to the public on the SJRRP website. The comments received assisted Reclamation and DWR in identifying the range of actions, alternatives, site design options, environmental resources, and mitigation measures that are analyzed in the EIS/R. Subsequent CEQA actions during the EIS/R process have been conducted by the CSLC as the State lead agency.

This section presents a summary of the comments received during the scoping process. If a similar comment was received from multiple participants, the comments were combined and reported as one comment.

Agriculture Related Comments

- Several landowners request a river restoration program with sustainable agriculture.
- Evaluate crop use, seepage, drainage, delivery systems, and access on both sides of Reach 2B on properties to be purchased for the project.
- Address current and/or potential drainage issues as related to crops and other land uses.
- Develop mitigation measures to eliminate impacts to crop loss and property destruction due to flooding and seepage.
- Outline a process for Project-related land purchases.
- Identify a manageable process for recourse for individual landowners that have been damaged by the Project and identify funding to alleviate potential lawsuits.
- Cooperate with local landowners and use local inherent knowledge.

Air Quality Related Comments

- Describe existing air quality conditions.
- Describe the regulatory environment.
- Include a discussion of the project including existing and post-project emissions and short-term and long term activities emissions.
- Evaluate significant impacts to air quality from construction detours around Mendota Pool Bypass.
- Evaluate potential health impacts of Toxic Air Contaminants to near-by receptors.

- Include a discussion of nuisance odors.
- Discuss feasible measures that will reduce air quality impacts.
- Include a discussion of cumulative air impacts.
- Include a discussion of greenhouse gas emissions consistent with the California Global Warming Solutions Act (AB 32).

Canal Distribution System Comments

- Ensure no interruption in water deliveries as a result of the Project.
- Ensure priority of the Exchange Contractor deliveries from the Friant system through the river channel.
- Discuss necessary relocations of pumps on the river and the necessity to be screened so as to be operable at all times.
- Evaluate and address relift wells and tailwater return systems.
- Evaluate the Columbia-Mowry Distribution System including the redesign of facility access, facility operation and maintenance, pumps, pipelines, and power (Pacific Gas and Electric Company/Western Area Power Administration).

Economic Development Comments

- Identify a method to quantify loss of farmlands in regional dollars.
- Evaluate the cumulative effects of taking primary farm land out of production to the economy of Firebaugh and Mendota.
- Acquire land to support recreation, tourism, flora, fauna and groundwater recharge.
- Evaluate the temporary and permanent loss of recreation resources in the specific areas during the construction of levees and flood control facilities.

Flood Control and Levee Comments

- The Project may be subject to 33 CFR 208.10 (encroachment of Federal flood control feature) or 33 USC 408 (alteration of Federal project).
- The Project may require a CVFPB encroachment permit as well as geotechnical analysis of the Project locations.
- Evaluate access from public roads and operation and maintenance costs on land purchased for the project.
- Identify who is responsible for cost of levee construction/maintenance.
- Evaluate shortening the channel distance to reduce levee length and maintenance costs.
- Evaluate the installation of cutoff channels before the river bends just downstream of the existing bifurcation structure to reduce flooding toward Highway 180.
- Evaluate channel capacity and flooding.

- Include an evaluation of flood protection (Reclamation, Lower San Joaquin Levee District, the Corps, Kings River) and/or seepage control.
- Evaluate Reach 2B flood waters that may intercept the little San Joaquin Slough and enter into the Fresno Slough.
- Evaluate the noise and vibration impacts on fish and birds from construction activities in the water, on the levees, and land-side supporting structures and flood control facilities.

Groundwater and Wells Comments

- Evaluate the relocation and reconnection of existing wells.
- Include a model and quantitative analyses of shallow ground water to evaluate potential river impacts.
- Use existing monitoring wells and production wells to assess rising groundwater as a result of this project.
- Include modeling and real time data collection before, during, after project completion.
- An ongoing ground water seepage monitoring and management plan should be included for Reach 2B and Mendota Pool.
- Benefits to ground water that are the result of the program flows should stay as a right to the overlying landowner.

Interim Flows Comments

- Interim flows are not similar to historical flow conditions.
- Interim flows do not simulate natural flooding conditions and analysis of Reach 2B should not proceed until flow data are available.
- Interim flows were not to be started until design and costs of all fish screens were determined and financial resources available.

Project Alternatives

- The Project needs to explore all alternatives that allow fish passage while taking least amount of prime farm land out of production.
- Use existing river channels.
- Evaluate the shortest route for the Mendota Pool Bypass.
- Evaluate the construction of a 1-mile bypass channel just north of Mendota Pool.
- Some local landowners support the planning and design of the alternative proposed by the Columbia Canal Company.
- Evaluate the installation of a wall across the river and north of Mendota Pool, with gate to divert water to Mendota Pool.
- Produce options that look at creative ways to put water into the Mendota Pool.
- Identify options that include water circulation through the Mendota Pool.

- Instead of digging new channels use the original channels and remove all obstructions in the river.
- Evaluate constructing the river channel deeper instead of building taller levees.
- The Project should include a fish diversion and fish screen facility for flows in the Mendota Pool as well as other fish screen locations along Reach 2B.
- Several landowners support the installation of fish screens on the inlet to the Mendota Pool at the new Bifurcation Structure near the head of the new Mendota Pool Bypass.
- The Program needs to adhere to the San Joaquin River Settlement Agreement and the San Joaquin River Restoration Settlement Act which calls for no third party impacts and outlines third party protections.
- The Project must maintain senior surface water diversion rights.
- Identify a process for continued channel capacity maintenance.
- Farmers who have farmed over the original river or made levees up to it should be made to help with restoration.
- The Mendota Pool Bypass will increase pollution.
- Several landowners do not believe the Mendota Pool Bypass is cost effective.
- Address and identify Project funding sources and assurances.
- Project should include an exit plan if funding and lawsuits halt the project.
- Evaluate the sequencing of construction events.
- The Project must address impacts of NMFS "Biological Opinions."
- Query the Natural Diversity Database and the USFWS Special Status Species Database to identify any special-status plant or wildlife species.
- Address cumulative impacts from loss of riparian vegetation and shaded riverine aquatic habitat and potential secondary impacts to listed runs of salmonids and listed avian species.
- Evaluate a range of alternatives for prevention programs for terrestrial and aquatic invasive species to slow the introduction of invasive species, such as the Quagga mussel, into high demand and sensitive areas. The alternatives should also consider current and proposed aquatic invasive species prevention programs.
- Examine if the project would favor non-native fisheries within the San Joaquin River.
- Analyze how to integrate proposed flows with existing water operations and activities.
- Evaluate agreements with all affected agencies for the operation, maintenance, repair, replacement, and liability issues.
- Analyze additional Mendota Dam maintenance responsibility.
- Evaluate Mendota Dam structural integrity in relation to Project operations.

- Explain how flows from Mendota Dam will be curtailed to permit dam maintenance.
- The Project must define actions, facility operations, agreements, permits, and environmental impacts of the Mendota Pool capturing restoration flows.
- Lead agencies should cooperate with local landowners and use their inherent knowledge.
- Several landowners would like to be involved with the design of channels and levees.
- Several landowners would like to be involved with evaluation of land acquisitions for mitigation purposes prior to final decision making.
- Several local agencies would like to review preliminary data prior to public distribution in order to protect private information.
- Native American or other potential terrestrial cultural sites need to be assessed within potential bypass areas (CFR Section 106).
- Evaluate the potential submerged cultural resources.
- Include cost and impact analysis of pumping, air pollution, and the project itself.
- Discuss the maximum amount of water that will be sent down the river.

Restoration Program Comments

- Include a complete Restoration Program summary and project specific relationships and benefits.
- Consider opportunities to offset some of the pumping from the Delta-Mendota Canal into the Mendota Pool, whether its flood flows or other, to reduce the pumping load.
- Use local firms, teams, and organizations that are familiar with the cultural and social landscapes.
- All communications and materials should be available in Spanish.
- Use all of the mediums that the Spanish-speaking populations use to gain feedback and encourage community engagement (i.e., Radio Compenseno, Radio Bilingue).
- There is a strong interest in providing work force opportunities for professional and non-professional labor for Hispanics and Latinos.
- The Restoration Program should remove the existing dam and improve the channel and restore the area for public access.
- Explain how the amount of proposed water will reach Reach 3.
- Identify funding for the entire Restoration Program.
- Reclamation should acknowledge delay in SJRRP implementation due to delayed legislation.

- Lead agencies should return to the timeline included in the Initial Program Alternatives Report - issuance of programmatic environmental impact analyses addressing the Settlement prior to issuing project specific EIS/R.
- Consider temporary programs outside the Restoration Program or Settlement Agreement that would evaluate local values and other societal benefits that could restore Valley wildlife, groundwater, and clean surface water.

Schedule Comments

- The Final EIS/R completion date is inconsistent with the 2012 fisheries reintroduction date.

Surface Water Comments

- Explain how the project addresses differences in elevation and water temperature between the Mendota Pool and the river channel.
- Avoid bifurcation of future flows and rely on the Chowchilla Bypass.
- Discuss the protection of the public water supply.
- Address the city of Mendota's public water supply intake relocation.
- Discuss and evaluate the priority of amount and timing of flows.

Traffic Comments

- Must submit traffic and detour plans for construction.
- Discuss the potential changes, impacts and mitigation measures to current transportation routes into and out of areas during the construction of project facilities.

Water Quality

- Include a spatial and temporal analysis of water quality problems/remedies.
- Address the issues of potential degradation of water quality and quantity to relocated river pumps.
- Consider increased turbidity and sedimentation of proposed construction activities along water-side river banks.
- The lead agencies should coordinate with the Central Valley RWQCB for the sharing and use of existing resources, information, data and monitoring networks.
- Evaluate existing local, State and Federal agency programs that reduce water quality concerns and the integration of such.
- Project must be in compliance with CWA.
- Project alternatives should evaluate how to increase irrigation water quality.

Wetland and Riparian Environment

- Include wetland and riparian delineation and analysis.
- Include wetland mitigation and compensation plans.

- Discuss wetland and riparian areas considerate of water quality, habitat and ecosystem.
- Maximize restoration and enhancement of functioning floodplains and riparian habitat.
- Discuss the Mendota wildlife area problems of water quality, temperature and current maintenance costs of existing riparian habitats.
- Evaluate all alternatives that avoid impacts to existing wetlands.
- Avoid dredging or filling waters of the United States.
- Some local landowners protest the re-introduction of salmon and the potential resultant negative impacts on the existing riparian habitat, especially in the Millburn Pond area.
- Protect endangered species.

27.2.2 Agencies and Organizations Consulted

This section discusses agency consultations and coordination that occurred during the development of the EIS/R and summarizes the agency involvement activities undertaken by Reclamation, CSLC, and DWR to satisfy NEPA and CEQA. Although initial CEQA actions were conducted by DWR, subsequent actions during the EIS/R process have been conducted by the CSLC as the State lead agency.

NEPA Cooperating Agencies

Reclamation invited eligible governmental entities to participate as cooperating agencies, in accordance with 43 CFR Part 46.225(3)(b), in developing the EIS/R. Several agencies requested identification as cooperating agencies under NEPA, including the EPA, Corps, NMFS, and Central California Irrigation District. These cooperating agencies were given the opportunity to review and comment on the Administrative Draft EIS/R and provide input to be considered during preparation of this Draft EIS/R.

Reclamation, as one of five Implementing Agencies, follows the public involvement/ public outreach plan, adopted in April 2007, to guide outreach. Stakeholder involvement has been and continues to be facilitated through SJRRP stakeholder meetings. As defined in 43 CFR Part 46.110, Reclamation is ultimately responsible for ensuring that consensus-based alternatives, if any, are fully consistent with NEPA, CEQ regulations, and applicable statutory and regulatory provisions.

CEQA Responsible Agencies

DWR initially contacted the responsible agencies through circulation of the Notice of Preparation, as required under CEQA. Comments were received from CSLC and SJVAPCD.

Native American Consultation

On behalf of Reclamation, Davis-King & Associates contacted the Native American Heritage Commission to request a Sacred Lands File search for sacred sites within the Restoration Area. The Native American Heritage Commission responded that its records

show an absence of sacred sites, but provided an extensive contact list of Native Americans who may have information about the Restoration Area.

27.2.3 Future Public Involvement

In accordance with NEPA and CEQA review requirements, this EIS/R will be circulated for public and agency review and comment for a 60-day period following the date when the EPA publishes the Notice of Availability in the Federal Register, and the CSLC staff files the Notice of Completion with the State Clearinghouse. Similar to the approach to public scoping, public meetings will be held to receive public input on the Draft EIS/R. These hearings will be held during the public comment period so that any comments received at the hearings can be addressed in the Final EIS/R. In addition, written comments from the public, reviewing agencies, and stakeholders will be accepted during the public comment period.

The Final EIS/R will be prepared and circulated in accordance with NEPA and CEQA requirements, and will include responses to comments. Reclamation will then issue its Record of Decision no less than 30 days after the final EIS/R is made available. The Record of Decision will identify Reclamation's decision regarding the alternatives considered, and address substantive comments received on the Final EIS/R.

Following lead agency consideration of all comments received during the public review period of the Draft EIS/R and circulation of the Final EIS/R, CSLC will hold a public meeting to consider certification of the Final EIR and decide whether to approve the Project. A NOD documenting the decision will be issued if the Project is approved. To support a decision on the proposed action, CSLC must prepare and adopt written findings of fact for each significant environmental impact identified in the Draft EIS/R, a statement of overriding considerations for any significant and unavoidable impacts, if needed, and a mitigation monitoring and reporting program for implementing the mitigation measures and project revisions, if any, identified in the Draft EIS/R.

27.3 Distribution List

This section provides a list of those Federal, State, and local agencies, as well as Indian Tribes, organizations, and individuals that will be notified of this EIS/R. A notice of availability will also be widely distributed, indicating the document is available for viewing on the SJRRP public website at w*ww.restoresjr.net*.

Federal Agencies

- Bureau of Indian Affairs
- Bureau of Land Management - San Joaquin River Gorge
- Federal Emergency Management Agency, Region IX
- National Marine Fisheries Service
- National Park Service, Pacific West Region

- Natural Resources Conservation Service
- Office of Environmental Policy and Compliance, Department of the Interior
- U.S. Army Corps of Engineers
- U.S. Coast Guard
- U.S. Coast Guard, Division of Boating Safety
- U.S. Department of Agriculture, Forest Service - Sierra National Forest
- U.S. Environmental Protection Agency, Region 9, CED-2, Com. & Ecosystem Division
- U.S. Environmental Protection Agency, WTR-3
- U.S. Fish & Wildlife Service
- U.S. Fish &Wildlife Service, Central Valley Joint Venture
- U.S. Geological Survey - California Water Science Center

United States Congress

- U.S. Congressional Representatives, 16th District Rep. Jim Costa and 21st District Rep. David Valadao
- U.S. Congressional Senators, Sen. Barbara Boxer and Sen. Dianne Feinstein

State Agencies

- California Air Resources Board
- California State Transportation Agency
- California Delta Protection Commission
- California Department of Conservation
- California Department of Fish and Wildlife
- California Department of Food and Agriculture
- California Department of Forestry and Fire Protection
- California Department of Parks and Recreation
- California Department of Parks and Recreation, Division of Boating and Waterways
- California Department of Toxic Substances Control
- California Department of Transportation
- California Department of Water Resources
- California Environmental Protection Agency
- California Highway Patrol
- California Natural Resources Agency
- California Office of Emergency Services

- California Office of Historic Preservation
- Central Valley Flood Protection Board
- Central Valley Regional Water Quality Control Board
- Native American Heritage Commission
- San Joaquin River Parkway and Conservation Trust
- San Joaquin Valley Air Pollution Control District
- State Clearinghouse
- State Water Resources Control Board
- University of California, Water Resources Center Archives

California Legislature

- California State Assembly, 5th District Asm. Frank Bigelow and 31st District Asm. Henry Perea
- California State Senate, 14th District Sen. Sen. Andy Vidak and 16th District Sen. Jean Fuller

Tribes

- Amah/Mutsun Tribal Band
- Big Sandy Rancheria of Mono Indians
- Choinumni Tribe
- Choinumni Tribe of Yokuts
- Chowchilla Tribe of Yokuts
- Cold Springs Rancheria of Mono Indians
- Dumna Tribal Government
- Dumna Wo-Wah Tribal Government
- Dunlap Band of Mono Indians
- Eshom Valley Band of Indians/Wuksachi Tribe
- Kings River Choinumni Farm Tribe
- Muwekma Ohlone Indian Tribe of the San Francisco Bay Area
- North Fork Mono Tribe
- North Valley Yokuts Tribe
- Ohlone Indian Tribe
- Picayune Rancheria of Chuckchansi Indians
- Santa Rosa Rancheria
- Sierra Nevada Native American Coalition

- Southern Sierra Miwuk Nation
- Table Mountain Rancheria

Libraries

- Fresno County Public Library – Firebaugh Branch Library
- Fresno County Public Library – Mendota Branch Library
- Los Banos Library
- University of California Riverside, Water Resources Center Archives

Local Agencies

- City of Firebaugh
- City of Mendota
- Fresno County Public Works and Planning Department
- Madera County Resource Management Agency

County Board of Supervisors

- Mr. Brian Pacheco, Fresno County Board of Supervisors, District 1
- Ms. Andreas Borgeas, Fresno County Board of Supervisors, District 2
- Mr. Henry Perea, Fresno County Board of Supervisors, District 3
- Ms. Buddy Mendes, Fresno County Board of Supervisors, District 4
- Ms. Debbie Poochigian, Fresno County Board of Supervisors, District 5
- Mr. Brett Frazier, Madera County Board of Supervisors, District 1
- Mr. David Rogers, Madera County Board of Supervisors, District 2
- Mr. Rick Farinelli, Madera County Board of Supervisors, District 3
- Mr. Max Rodriguez, Madera County Board of Supervisors, District 4
- Mr. Tom Wheeler, Madera County Board of Supervisors, District 5

Organizations

- Central California Irrigation District
- Chowchilla Water District
- Columbia Canal Company
- Farmers Water District
- Firebaugh Canal Water District
- Friant Water Authority
- Gill Ranch Storage

- Grassland Water District
- James Irrigation District
- Kings River Conservation District
- Kings River Water Association
- Lower San Joaquin Levee District
- Mendota Pool Group
- Mitigation Lands Trust
- Natural Resources Defense Council
- Resources Management Coalition
- River Partners
- San Joaquin River Conservancy
- San Joaquin River Exchange Contractors Water Authority
- San Joaquin Tributary Association
- San Luis & Delta-Mendota Water Authority
- The Nature Conservancy
- Tranquility Irrigation District
- Westlands Water District

Individuals

- Barry Baker, Baker Farming
- Thomas M. Berliner, Duane Morris LLP
- Robert Brewer, Mitigation Lands Trust
- Kimberly Brown, Paramount Farming Company
- Roy Catania, Paramount Farming Company
- Shawn Coburn
- Joe Coelho, Terra Linda River Ranch
- Jason Dean, Meyers Water Bank & Wildlife Project
- Arlow Ekhard, Gill Ranch Storage
- John Foseid, Gill Ranch Storage
- Robert Frusetta
- Tom Johnson, Restoration Administrator
- Thomas Keene, Linneman, Burgess, Telles, Van Atta, Vierra, Rathmann, Whitehurst & Keene
- Thomas Lopes
- Joe MacIlvaine, Paramount Farming Company

- Jim Merrill
- Don Peracchi, DJP Farms
- Curtis Reeve
- Jim Stillwell, Logoluso Farms
- Rob Tull, CH2M HILL
- Bill Ward, BB Limited
- Mike Widhalm, Paramount Farming Company

28.0 References

28.1 Chapter 1 – Introduction

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30.0 Index

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Mendota Pool Bypass and Reach 2B Improvements Project

Appendix 4-A

Draft
Environmental Impact Statement/Report

SAN JOAQUIN RIVER
RESTORATION PROGRAM

Draft
June 2015

Construction Offroad Emissions

Schedule Name	Year	CO	NOX	ROG	SOX	PM	CO2
		tons					Metric tons
2	2014	3.49	8.91	0.71	0.01	0.34	832.51
2	2015	11.87	29.37	2.42	0.03	1.13	3,020.86
2	2016	9.24	23.93	2.01	0.02	0.93	2,484.00
2	2017	1.76	4.79	0.42	0.00	0.20	522.46
4	2014	3.94	9.95	0.80	0.01	0.38	943.11
4	2015	12.61	31.47	2.60	0.03	1.21	3,245.09
4	2016	8.07	21.20	1.80	0.02	0.83	2,227.15
4	2017	1.95	5.21	0.46	0.01	0.21	564.01
4	2018	0.55	1.58	0.14	0.00	0.06	175.71
7	2018	5.61	14.01	1.13	0.01	0.53	1,330.59
7	2019	8.33	21.43	1.80	0.02	0.82	2,345.73
7	2020	10.97	27.78	2.32	0.03	1.07	2,948.28
7	2021	9.53	24.33	2.06	0.03	0.94	2,633.38
7	2022	7.22	18.77	1.59	0.02	0.72	2,075.11
7	2023	3.73	9.85	0.85	0.01	0.39	1,098.73
8	2018	5.61	14.01	1.13	0.01	0.53	1,330.59
8	2019	8.32	21.40	1.80	0.02	0.82	2,342.85
8	2020	8.50	21.70	1.81	0.02	0.83	2,330.07
8	2021	7.11	18.25	1.56	0.02	0.71	2,016.36
8	2022	7.62	19.90	1.69	0.02	0.77	2,230.57
8	2023	2.78	7.30	0.63	0.01	0.29	805.36
9	2018	2.67	6.58	0.53	0.01	0.25	639.50
9	2019	12.41	31.78	2.63	0.03	1.20	3,356.52
9	2020	11.82	30.48	2.57	0.03	1.18	3,282.92
9	2021	9.63	24.69	2.05	0.03	0.94	2,624.86
9	2022	4.92	12.92	1.10	0.01	0.51	1,380.46

Alternative	Year	CO	NOX	ROG	SOX	PM	CO2
		tons					Metric tons
A	2014	3.49	8.91	0.71	0.01	0.34	832.51
A	2015	11.87	29.37	2.42	0.03	1.13	3,020.86
A	2016	9.24	23.93	2.01	0.02	0.93	2,484.00
A	2017	1.76	4.79	0.42	0.00	0.20	522.46
A	2018	5.61	14.01	1.13	0.01	0.53	1,330.59
A	2019	8.33	21.43	1.80	0.02	0.82	2,345.73
A	2020	10.97	27.78	2.32	0.03	1.07	2,948.28
A	2021	9.53	24.33	2.06	0.03	0.94	2,633.38
A	2022	7.22	18.77	1.59	0.02	0.72	2,075.11
A	2023	3.73	9.85	0.85	0.01	0.39	1,098.73
B	2014	3.94	9.95	0.80	0.01	0.38	943.11
B	2015	12.61	31.47	2.60	0.03	1.21	3,245.09
B	2016	8.07	21.20	1.80	0.02	0.83	2,227.15
B	2017	1.95	5.21	0.46	0.01	0.21	564.01
B	2018	6.16	15.59	1.27	0.01	0.60	1,506.30
B	2019	8.32	21.40	1.80	0.02	0.82	2,342.85
B	2020	8.50	21.70	1.81	0.02	0.83	2,330.07
B	2021	7.11	18.25	1.56	0.02	0.71	2,016.36
B	2022	7.62	19.90	1.69	0.02	0.77	2,230.57
B	2023	2.78	7.30	0.63	0.01	0.29	805.36
C	2014	3.49	8.91	0.71	0.01	0.34	832.51
C	2015	11.87	29.37	2.42	0.03	1.13	3,020.86
C	2016	9.24	23.93	2.01	0.02	0.93	2,484.00
C	2017	1.76	4.79	0.42	0.00	0.20	522.46
C	2018	2.67	6.58	0.53	0.01	0.25	639.50
C	2019	12.41	31.78	2.63	0.03	1.20	3,356.52
C	2020	11.82	30.48	2.57	0.03	1.18	3,282.92
C	2021	9.63	24.69	2.05	0.03	0.94	2,624.86
C	2022	4.92	12.92	1.10	0.01	0.51	1,380.46
D	2014	3.94	9.95	0.80	0.01	0.38	943.11
D	2015	12.61	31.47	2.60	0.03	1.21	3,245.09
D	2016	8.07	21.20	1.80	0.02	0.83	2,227.15
D	2017	1.95	5.21	0.46	0.01	0.21	564.01
D	2018	3.22	8.16	0.67	0.01	0.32	815.21
D	2019	12.41	31.78	2.63	0.03	1.20	3,356.52
D	2020	11.82	30.48	2.57	0.03	1.18	3,282.92
D	2021	9.63	24.69	2.05	0.03	0.94	2,624.86
D	2022	4.92	12.92	1.10	0.01	0.51	1,380.46
A	Total	71.76	183.17	15.29	0.18	7.07	19,291.66
B	Total	67.06	171.96	14.40	0.17	6.64	18,210.87
C	Total	67.82	173.45	14.44	0.17	6.68	18,144.09
D	Total	68.56	175.85	14.67	0.18	6.78	18,439.33

1. Activity data was provided by DWR according to 5 report schedules with a specified combination of report schedules for a given alternative. The second report added for an alternative had a start date assumed of 9/1/2018.

2. Emission factors are based on OFFROAD 2011 as compiled in the Roadway Model. The emission factors are all from year 2014 regardless of the calendar year contained in the schedule to be conservative and flexible with scheduling of specific construction phases.

Construction Offroad Emission Factors

EquipID	Equipment Name	OFFROAD Equipment Name	AvgHP	LF	CO	CO2	NOX	PM	ROG	SOX
					g/hp-hr					
1	Pickup	Off-Highway Trucks	372	0.38	0.6099	201.4303	1.7895	0.0686	0.1573	0.0019
2	Flatrack Truck	Off-Highway Trucks	372	0.38	0.6099	201.4303	1.7895	0.0686	0.1573	0.0019
3	Air Compressor (Sullair 125)	Air Compressors	78	0.48	1.8614	272.7838	2.6861	0.2370	0.4312	0.0032
4	Loader JD 210C 4x4 (Cat 416)	Tractors/Loaders/Backhoes	83	0.37	0.9137	195.0935	2.0565	0.1616	0.2245	0.0019
5	Loader/Backhoe JD 710 (Cat 446)	Tractors/Loaders/Backhoes	83	0.37	0.9137	195.0935	2.0565	0.1616	0.2245	0.0019
6	Excavator Cat 330L	Excavators	218	0.38	0.9736	199.9869	1.6704	0.0530	0.1176	0.0019
7	Excavator Cat 345	Excavators	329	0.38	0.9697	199.1718	1.2804	0.0413	0.0930	0.0019
8	Loader Cat 950	Rubber Tired Loaders	206	0.36	0.8853	188.3234	1.9882	0.0676	0.1540	0.0018
9	Loader Cat 966	Rubber Tired Loaders	320	0.36	0.8824	187.6982	1.8793	0.0708	0.1595	0.0018
10	Loader Cat 980	Rubber Tired Loaders	320	0.36	0.8824	187.6982	1.8793	0.0708	0.1595	0.0018
11	Dozer Cat D6	Rubber Tired Dozers	211	0.40	0.9733	208.0791	3.1514	0.1551	0.2984	0.0020
12	Dozer Cat D8	Rubber Tired Dozers	354	0.40	0.9821	209.9459	3.1854	0.1485	0.2926	0.0020
13	Dozer Cat D10	Rubber Tired Dozers	584	0.40	0.9692	207.1907	2.8252	0.1018	0.2123	0.0020
14	Scraper Cat 613	Scrapers	225	0.48	1.1299	250.4320	4.2523	0.1944	0.3746	0.0024
15	Scraper Cat 623	Scrapers	381	0.48	1.1398	252.6332	3.0068	0.1213	0.2417	0.0024
16	Scraper Cat 631	Scrapers	381	0.48	1.1398	252.6332	3.0068	0.1213	0.2417	0.0024
17	Scraper Cat 657 Push-Pull	Scrapers	1923	0.48	1.1631	257.7962	3.5284	0.1323	0.2572	0.0025
18	Motor Grader Cat 140H	Graders	204	0.41	1.1213	216.0922	2.3459	0.0757	0.1667	0.0021
19	Motor Grader Cat 143H	Graders	204	0.41	1.1213	216.0922		0.0757	0.1667	0.0021
20	Motor Grader Cat 14H	Graders	204	0.41	1.1213	216.0922	2.3459	0.0757	0.1667	0.0021
21	Asphalt Paver	Pavers	158	0.42	1.2801	217.2863	2.3829	0.1192	0.2184	0.0021
22	Oil Distributor Truck	Off-Highway Trucks	372	0.38	0.6099	201.4303	1.7895	0.0686	0.1573	0.0019
23	Shuttle Buggy (Roadtec MTV)	Paving Equipment	339	0.36	1.1657	184.4846	1.6394	0.0584	0.1166	0.0018
24	Roller 1-3 Ton	Rollers	36	0.38	1.1807	218.6858	2.0235	0.1814	0.5137	0.0021
25	Roller 4-6 Ton	Rollers	36	0.38	1.1807	218.6858	2.0235	0.1814	0.5137	0.0021
26	Roller 7-9 Ton	Rollers	87	0.38	1.0638	197.0340	2.3977	0.1785	0.2729	0.0019
27	Roller 10+ Ton	Rollers	144	0.38	1.0593	196.2001	1.7724	0.0822	0.1445	0.0019
28	Rubber Tire Roller	Rollers	87	0.38	1.0638	197.0340	2.3977	0.1785	0.2729	0.0019
29	66" Single Drum Roller	Rollers	87	0.38	1.0638	197.0340	2.3977	0.1785	0.2729	0.0019
30	84" Single Drum Roller	Rollers	144	0.38	1.0593	196.2001	1.7724	0.0822	0.1445	0.0019
31	Compactor Cat 815	Other Construction Equipment	217	0.42	1.2029	218.8062	2.3973	0.0882	0.1763	0.0021
32	Compactor Cat 825	Other Construction Equipment	357	0.42	1.2042	219.0521	1.8946	0.0698	0.1433	0.0021
33	Power Kick Brooms	Sweepers/Scrubbers	36	0.46	1.5435	265.1539	2.6204	0.2746	0.8428	0.0025
34	Street Sweeper/Pickup Broom	Sweepers/Scrubbers	303	0.46	1.3870	238.2645	2.7437	0.1185	0.2180	0.0023
35	Water Truck (2,000 Gal)	Water Trucks	372	0.38	0.6099	201.4303	1.7895	0.0686	0.1573	0.0019
36	Water Truck (4,000 Gal)	Water Trucks	372	0.38	0.6099	201.4303	1.7895	0.0686	0.1573	0.0019
37	Double Bottom Dump Truck (25 TN)	Off-Highway Trucks	372	0.38	0.6099	201.4303	1.7895	0.0686	0.1573	0.0019
38	Transfer Truck (25 TN)	Off-Highway Trucks	372	0.38	0.6099	201.4303	1.7895	0.0686	0.1573	0.0019
39	Semi End Dump Truck (25 TN)	Off-Highway Trucks	372	0.38	0.6099	201.4303	1.7895	0.0686	0.1573	0.0019
40	Low Bed Truck	Off-Highway Trucks	372	0.38	0.6099	201.4303	1.7895	0.0686	0.1573	0.0019
41	Pump (Diesel 3" x 3")	Pumps	21	0.74	2.0479	420.5420	3.6948	0.2147	0.7055	0.0053
42	Fork Lift Cat TH560B Telescopic Handler	Rough Terrain Forklifts	96	0.40	1.1447	210.4867	1.7958	0.1049	0.1476	0.0020
43	Crane Grove RT990	Cranes	336	0.29	0.7523	150.6500	1.8047	0.0748	0.1456	0.0014
45	Sheet Pile Driver Power Bruce PQ-700V	Generator Sets	586	0.74	0.8525	420.5419	2.7473	0.0784	0.2129	0.0042
49	Hydraulic Pile Driver Power Bruce PQ-700V	Generator Sets	586	0.74	0.8525	420.5419	2.7473	0.0784	0.2129	0.0042
51	Excavator with Auger Attachment Cat 330L	Excavators	218	0.38	0.9736	199.9869	1.6704	0.0530	0.1176	0.0019
52	Excavator with Driver Attachment Cat 330L	Excavators	218	0.38	0.9736	199.9869	1.6704	0.0530	0.1176	0.0019
53	Skid Steer Loader Cat 277B	Skid Steer Loaders	71	0.37	1.2340	192.8723	1.4789	0.0864	0.1173	0.0018
54	Concrete Pump Mack Truck & 36-47M Pump	Other Construction Equipment	357	0.42	1.2042	219.0521	1.8946	0.0698	0.1433	0.0021

Notes:

1. Equipment was supplied by DWR for various construction schedule phases. This included the horsepower and load factor.
2. Emission factors are from OFFROAD 2011 for 2014

Construction Phase Mapping to Model Sources

Alternative	Schedule Name	Group	SRCID
A	2	GROUP 1	CNS
A	2	GROUP 2	CNS
A	2	GROUP 3	CHILLA
A	2	GROUP 4	SMCROSS
A	2	GROUP 5	LONE
A	2	GROUP 6	CNS
A	2	GROUP 7	CNS
A	2	GROUP 8	CNS
A	7	GROUP 1	CCANAL
A	7	GROUP 10	CNS
A	7	GROUP 11	CCANAL
A	7	GROUP 12	SCANAL
A	7	GROUP 13	CCANAL
A	7	GROUP 14	CCANAL
A	7	GROUP 15	SCANAL
A	7	GROUP 16	CNS
A	7	GROUP 2	CCANAL
A	7	GROUP 3	CCANAL
A	7	GROUP 4	CCANAL
A	7	GROUP 5	CHILLA
A	7	GROUP 6	CHILLA
A	7	GROUP 7	CNS
A	7	GROUP 8	CCANAL
A	7	GROUP 9	SCANAL
B	4	Group 1	CWB
B	4	Group 2	CWB
B	4	Group 3	CHILLA
B	4	Group 4	SMCROSS
B	4	Group 5	LONE
B	4	Group 6	CWB
B	4	Group 7	CWB
B	4	Group 8	CWB
B	8	GROUP 1	CCANAL
B	8	GROUP 10	CWB
B	8	GROUP 11	CCANAL
B	8	GROUP 12	CCANAL
B	8	GROUP 13	CCANAL
B	8	GROUP 14	CHILLA
B	8	GROUP 15	CCANAL
B	8	GROUP 16	CWB
B	8	GROUP 2	CCANAL
B	8	GROUP 3	CWB
B	8	GROUP 4	CCANAL
B	8	GROUP 5	CHILLA
B	8	GROUP 6	CCANAL
B	8	GROUP 7	CWB
B	8	GROUP 8	CCANAL
B	8	GROUP 9	CCANAL
C	2	GROUP 1	FNS
C	2	GROUP 2	FNS
C	2	GROUP 3	CHILLA

Construction Phase Mapping to Model Sources

Alternative	Schedule Name	Group	SRCID
C	2	GROUP 4	SMCROSS
C	2	GROUP 5	LONE
C	2	GROUP 6	FNS
C	2	GROUP 7	FNS
C	2	GROUP 8	FNS
C	9	GROUP 1	FNS
C	9	GROUP 10	FSDC
C	9	GROUP 11	FSDC
C	9	GROUP 12	FSDC
C	9	GROUP 13	FSDC
C	9	GROUP 14	FNS
C	9	GROUP 2	FNS
C	9	GROUP 3	FNS
C	9	GROUP 4	FSDC
C	9	GROUP 5	CHILLA
C	9	GROUP 6	FSDC
C	9	GROUP 7	FSDC
C	9	GROUP 8	FSDC
C	9	GROUP 9	FSDC
D	4	Group 1	FWN
D	4	Group 2	FWN
D	4	Group 3	CHILLA
D	4	Group 4	SMCROSS
D	4	Group 5	LONE
D	4	Group 6	FWN
D	4	Group 7	FWN
D	4	Group 8	FWN
D	9	GROUP 1	FWN
D	9	GROUP 10	NCANAL
D	9	GROUP 11	FSDC
D	9	GROUP 12	FSDC
D	9	GROUP 13	NCANAL
D	9	GROUP 14	FWN
D	9	GROUP 2	FWN
D	9	GROUP 3	FWN
D	9	GROUP 4	FSDC
D	9	GROUP 5	CHILLA
D	9	GROUP 6	FSDC
D	9	GROUP 7	NCANAL
D	9	GROUP 8	NCANAL
D	9	GROUP 9	FSDC

Notes:

1. The construction phase and Alternative was used to map the emissions from a given phase to a modeled work location.

Construction Onroad Vehicle Emissions

Alternative	Year	CO	NOx	VOC	SOx	PM10	PM2.5	CO2	CH4	CO2e
	2014	20.06	55.28	3.44	0.10	2.80	2.35	9,120	0.16	9,123
	2015	60.17	165.84	10.33	0.29	8.41	7.04	27,359	0.47	27,369
	2016	60.17	165.84	10.33	0.29	8.41	7.04	27,359	0.47	27,369
	2017	55.16	152.02	9.47	0.27	7.71	6.46	25,079	0.43	25,088
	2018	50.52	143.84	8.84	0.25	7.28	6.10	23,480	0.39	23,488
	2019	151.57	431.52	26.53	0.75	21.84	18.31	70,439	1.17	70,463
	2020	151.57	431.52	26.53	0.75	21.84	18.31	70,439	1.17	70,463
	2021	151.57	431.52	26.53	0.75	21.84	18.31	70,439	1.17	70,463
	2022	151.57	431.52	26.53	0.75	21.84	18.31	70,439	1.17	70,463
A	2023	138.93	395.56	24.32	0.69	20.02	16.78	64,569	1.08	64,591
	2014	19.99	55.08	3.43	0.10	2.79	2.34	9,088	0.16	9,091
	2015	59.97	165.25	10.30	0.29	8.38	7.02	27,263	0.47	27,273
	2016	59.97	165.25	10.30	0.29	8.38	7.02	27,263	0.47	27,273
	2017	59.97	165.25	10.30	0.29	8.38	7.02	27,263	0.47	27,273
	2018	71.63	201.43	12.45	0.35	10.20	8.55	33,012	0.56	33,024
	2019	139.94	397.72	24.47	0.70	20.13	16.87	64,957	1.08	64,980
	2020	139.94	397.72	24.47	0.70	20.13	16.87	64,957	1.08	64,980
	2021	139.94	397.72	24.47	0.70	20.13	16.87	64,957	1.08	64,980
	2022	139.94	397.72	24.47	0.70	20.13	16.87	64,957	1.08	64,980
B	2023	104.95	298.29	18.35	0.52	15.10	12.65	48,718	0.81	48,735
	2014	20.06	55.28	3.44	0.10	2.80	2.35	9,120	0.16	9,123
	2015	60.17	165.84	10.33	0.29	8.41	7.04	27,359	0.47	27,369
	2016	60.17	165.84	10.33	0.29	8.41	7.04	27,359	0.47	27,369
	2017	55.16	152.02	9.47	0.27	7.71	6.46	25,079	0.43	25,088
	2018	31.79	89.38	5.52	0.16	4.53	3.79	14,649	0.25	14,654
	2019	95.36	268.14	16.57	0.47	13.58	11.38	43,947	0.74	43,962
	2020	95.36	268.14	16.57	0.47	13.58	11.38	43,947	0.74	43,962
	2021	95.36	268.14	16.57	0.47	13.58	11.38	43,947	0.74	43,962
C	2022	95.36	268.14	16.57	0.47	13.58	11.38	43,947	0.74	43,962
	2014	19.99	55.08	3.43	0.10	2.79	2.34	9,088	0.16	9,091
	2015	59.97	165.25	10.30	0.29	8.38	7.02	27,263	0.47	27,273
	2016	59.97	165.25	10.30	0.29	8.38	7.02	27,263	0.47	27,273
	2017	59.97	165.25	10.30	0.29	8.38	7.02	27,263	0.47	27,273
	2018	56.77	158.23	9.81	0.28	8.02	6.72	26,008	0.44	26,018
	2019	95.36	268.14	16.57	0.47	13.58	11.38	43,947	0.74	43,962
	2020	95.36	268.14	16.57	0.47	13.58	11.38	43,947	0.74	43,962
	2021	95.36	268.14	16.57	0.47	13.58	11.38	43,947	0.74	43,962
D	2022	95.36	268.14	16.57	0.47	13.58	11.38	43,947	0.74	43,962

Notes:

1. The number of trip and trip lengths for workers and material hauling is shown in Table 5.
2. Emission factors are from EMFAC2007 for calendar year 2014.

Construction Vehicle Trips and Trip Lengths

Alternative	Report	Truck Trips per Day	Worker Trips Per Day	Days	Trip length Truck	Trip length Work	Total Worker Trips	Total Truck Trips	VMT Worker	VMT Truck
A	2	558	200	702	135	35	140,400	391,716	4,914,000	52,881,660
A	7	1,454	200	1134	135	35	226,800	1,648,836	7,938,000	222,592,860
B	4	556	200	810	135	35	162,000	450,360	5,670,000	60,798,600
B	8	1,340	200	1098	135	35	219,600	1,471,320	7,686,000	198,628,200
C	2	558	200	702	135	35	140,400	391,716	4,914,000	52,881,660
C	9	903	200	936	135	35	187,200	845,208	6,552,000	114,103,080
D	4	556	200	810	135	35	162,000	450,360	5,670,000	60,798,600
D	9	903	200	936	135	35	187,200	845,208	6,552,000	114,103,080

Notes:

1. The number of daily truck trips and workers by report is based on information provided by DWR and is consistent with assumptions used in the traffic analysis.

2. The truck trip length was estimated based on the approximate average trip length of material source locations as provided by DWR. Worker trip length was assumed to be 35 miles which is the approximate distance from Madera or Fresno.

Construction Vehicle Emission Factors

Pollutant	Emission Type	Vehicle Class	Type	Speed	EF	Units
CH4	Running	HHDT	Exhaust	25	0.055	g/mile
CH4	Running	Worker	Exhaust	25	0.02475	g/mile
CH4	Running	HHDT	Exhaust	55	0.026	g/mile
CH4	Running	Worker	Exhaust	55	0.01675	g/mile
CH4	Starting	HHDT	Exhaust	25	0.143	g/trip
CH4	Starting	Worker	Exhaust	25	0.04225	g/trip
CH4	Starting	HHDT	Exhaust	55	0.143	g/trip
CH4	Starting	Worker	Exhaust	55	0.04225	g/trip
CO	Running	HHDT	Exhaust	25	4.584	g/mile
CO	Running	Worker	Exhaust	25	2.3855	g/mile
CO	Running	HHDT	Exhaust	55	2.862	g/mile
CO	Running	Worker	Exhaust	55	1.69725	g/mile
CO	Starting	HHDT	Exhaust	25	42.041	g/trip
CO	Starting	Worker	Exhaust	25	8.86475	g/trip
CO	Starting	HHDT	Exhaust	55	42.041	g/trip
CO	Starting	Worker	Exhaust	55	8.86475	g/trip
CO2	Running	HHDT	Exhaust	25	2026.279	g/mile
CO2	Running	Worker	Exhaust	25	432.63475	g/mile
CO2	Running	HHDT	Exhaust	55	1648.397	g/mile
CO2	Running	Worker	Exhaust	55	344.39225	g/mile
CO2	Starting	HHDT	Exhaust	25	57.439	g/trip
CO2	Starting	Worker	Exhaust	25	230.3475	g/trip
CO2	Starting	HHDT	Exhaust	55	57.439	g/trip
CO2	Starting	Worker	Exhaust	55	230.3475	g/trip
Nox	Running	HHDT	Exhaust	25	10.379	g/mile
Nox	Running	Worker	Exhaust	25	0.234	g/mile
Nox	Running	HHDT	Exhaust	55	9.211	g/mile
Nox	Running	Worker	Exhaust	55	0.2195	g/mile
NOx	Starting	HHDT	Exhaust	25	1.879	g/trip
NOx	Starting	Worker	Exhaust	25	0.3825	g/trip
NOx	Starting	HHDT	Exhaust	55	1.879	g/trip
NOx	Starting	Worker	Exhaust	55	0.3825	g/trip
PM10	Brake wear	HHDT	Fugitive	25	0.028	g/mile
PM10	Brake wear	Worker	Fugitive	25	0.013	g/mile
PM10	Brake wear	HHDT	Fugitive	55	0.028	g/mile
PM10	Brake wear	Worker	Fugitive	55	0.013	g/mile
PM10	Running	HHDT	Exhaust	25	0.395	g/mile
PM10	Running	Worker	Exhaust	25	0.02	g/mile
PM10	Running	HHDT	Exhaust	55	0.402	g/mile
PM10	Running	Worker	Exhaust	55	0.0115	g/mile
PM10	Starting	HHDT	Exhaust	25	0.004	g/trip
PM10	Starting	Worker	Exhaust	25	0.02275	g/trip
PM10	Starting	HHDT	Exhaust	55	0.004	g/trip
PM10	Starting	Worker	Exhaust	55	0.02275	g/trip
PM10	Tire wear	HHDT	Fugitive	25	0.036	g/mile
PM10	Tire wear	Worker	Fugitive	25	0.008	g/mile
PM10	Tire wear	HHDT	Fugitive	55	0.036	g/mile
PM10	Tire wear	Worker	Fugitive	55	0.008	g/mile
PM2.5	Brake wear	HHDT	Fugitive	25	0.012	g/mile
PM2.5	Brake wear	Worker	Fugitive	25	0.005	g/mile
PM2.5	Brake wear	HHDT	Fugitive	55	0.012	g/mile

Construction Vehicle Emission Factors

Pollutant	Emission Type	Vehicle Class	Type	Speed	EF	Units
PM2.5	Brake wear	Worker	Fugitive	55	0.005	g/mile
PM2.5	Running	HHDT	Exhaust	25	0.363	g/mile
PM2.5	Running	Worker	Exhaust	25	0.01825	g/mile
PM2.5	Running	HHDT	Exhaust	55	0.37	g/mile
PM2.5	Running	Worker	Exhaust	55	0.01075	g/mile
PM2.5	Starting	HHDT	Exhaust	25	0.003	g/trip
PM2.5	Starting	Worker	Exhaust	25	0.0205	g/trip
PM2.5	Starting	HHDT	Exhaust	55	0.003	g/trip
PM2.5	Starting	Worker	Exhaust	55	0.0205	g/trip
PM2.5	Tire wear	HHDT	Fugitive	25	0.009	g/mile
PM2.5	Tire wear	Worker	Fugitive	25	0.002	g/mile
PM2.5	Tire wear	HHDT	Fugitive	55	0.009	g/mile
PM2.5	Tire wear	Worker	Fugitive	55	0.002	g/mile
ROG	Diurnal	HHDT	Evaporative	25	0	g/start
ROG	Diurnal	Worker	Evaporative	25	0.708	g/start
ROG	Diurnal	HHDT	Evaporative	55	0	g/start
ROG	Diurnal	Worker	Evaporative	55	0.708	g/start
ROG	Hot Soak	HHDT	Evaporative	25	0.017	g/trip
ROG	Hot Soak	Worker	Evaporative	25	0.2275	g/trip
ROG	Hot Soak	HHDT	Evaporative	55	0.017	g/trip
ROG	Hot Soak	Worker	Evaporative	55	0.2275	g/trip
ROG	Resting	HHDT	Evaporative	25	0	g/start
ROG	Resting	Worker	Evaporative	25	0.345	g/start
ROG	Resting	HHDT	Evaporative	55	0	g/start
ROG	Resting	Worker	Evaporative	55	0.345	g/start
ROG	Running	HHDT	Exhaust	25	0.947	g/mile
ROG	Running	HHDT	Evaporative	25	0.0024	g/mile
ROG	Running	Worker	Evaporative	25	0.1026	g/mile
ROG	Running	Worker	Exhaust	25	0.07425	g/mile
ROG	Running	HHDT	Exhaust	55	0.543	g/mile
ROG	Running	HHDT	Evaporative	55	0.00109091	g/mile
ROG	Running	Worker	Evaporative	55	0.04663636	g/mile
ROG	Running	Worker	Exhaust	55	0.046	g/mile
ROG	Starting	HHDT	Exhaust	25	2.43	g/trip
ROG	Starting	Worker	Exhaust	25	0.74325	g/trip
ROG	Starting	HHDT	Exhaust	55	2.43	g/trip
ROG	Starting	Worker	Exhaust	55	0.74325	g/trip
SOx	Running	HHDT	Exhaust	25	0.019	g/mile
SOx	Running	Worker	Exhaust	25	0.0045	g/mile
SOx	Running	HHDT	Exhaust	55	0.016	g/mile
SOx	Running	Worker	Exhaust	55	0.0035	g/mile
SOX	Starting	HHDT	Exhaust	25	0.001	g/trip
SOX	Starting	Worker	Exhaust	25	0.0025	g/trip
SOX	Starting	HHDT	Exhaust	55	0.001	g/trip
SOX	Starting	Worker	Exhaust	55	0.0025	g/trip

Notes:

1. Emission Factors are based on EMFAC 2007.

Emissions from Grading and Bulldozing

Schedule Name	Year	PM10	PM2.5
2	2014	2.13	0.92
2	2015	4.26	1.76
2	2016	3.90	1.77
2	2017	0.12	0.01
4	2014	2.36	1.02
4	2015	4.33	1.80
4	2016	3.21	1.48
4	2017	0.17	0.02
7	2018	3.91	1.75
7	2019	2.75	1.37
7	2020	3.73	1.68
7	2021	2.50	1.15
7	2022	0.95	0.40
7	2023	0.20	0.08
8	2018	3.91	1.75
8	2019	2.75	1.37
8	2020	1.94	0.81
8	2021	1.50	0.76
8	2022	0.52	0.19
8	2023	0.16	0.06
9	2018	1.49	0.65
9	2019	5.42	2.57
9	2020	3.77	1.78
9	2021	2.53	1.05
9	2022	0.76	0.31
Alternative	**Year**	**PM10**	**PM2.5**
	2014	2.13	0.92
	2015	4.26	1.76
	2016	3.90	1.77
	2017	0.12	0.01
	2018	3.91	1.75
	2019	2.75	1.37
	2020	3.73	1.68
	2021	2.50	1.15
	2022	0.95	0.40
A	2023	0.20	0.08
	2014	2.36	1.02
	2015	4.33	1.80
	2016	3.21	1.48
	2017	0.17	0.02
	2018	3.91	1.75
	2019	2.75	1.37
	2020	1.94	0.81
	2021	1.50	0.76
	2022	0.52	0.19
B	2023	0.16	0.06
	2014	2.13	0.92
	2015	4.26	1.76
	2016	3.90	1.77
	2017	0.12	0.01
	2018	1.49	0.65
	2019	5.42	2.57
	2020	3.77	1.78
	2021	2.53	1.05
C	2022	0.76	0.31
	2014	2.36	1.02
	2015	4.33	1.80
	2016	3.21	1.48
	2017	0.17	0.02
	2018	1.49	0.65
	2019	5.42	2.57
	2020	3.77	1.78
	2021	2.53	1.05
D	2022	0.76	0.31

Notes:
1. Emissions were caclulated following the AP-42

Emissions from Loading and Unloading Material

Alternative	Year	Volume of Material Loaded	Weighting	EF PM10	Emissions PM10 (ton)	EF PM2.5	Emissions PM2.5 (ton)
	2014		0.06		0.003		0.001
	2015		0.36		0.019		0.003
	2016		0.44		0.023		0.003
	2017	345200	0.14		0.007		0.001
	2018		0.06		0.003		0.000
	2019		0.14		0.006		0.001
	2020		0.21		0.009		0.001
	2021		0.26		0.011		0.002
	2022		0.19		0.008		0.001
A	2023	269700	0.14		0.006		0.001
	2014		0.06		0.003		0.000
	2015		0.45		0.022		0.003
	2016		0.32		0.016		0.002
	2017	328600	0.12		0.006		0.001
	2018	555500	0.11		0.004		0.001
	2019		0.14		0.005		0.001
	2020		0.22		0.007		0.001
	2021		0.27		0.009		0.001
	2022		0.20		0.007		0.001
B	2023	226900	0.11		0.004		0.001
	2014		0.06		0.003		0.000
	2015		0.36		0.017		0.003
	2016		0.44		0.021		0.003
	2017	317500	0.14		0.007		0.001
	2018		0.04		0.001		0.000
	2019		0.14		0.005		0.001
	2020		0.34		0.012		0.002
	2021		0.23		0.008		0.001
C	2022	224500	0.25		0.008		0.001
	2014		0.06		0.002		0.000
	2015		0.45		0.019		0.003
	2016		0.32		0.013		0.002
	2017	272000	0.12		0.005		0.001
	2018	460250	0.09		0.003		0.000
	2019		0.14		0.004		0.001
	2020		0.34		0.010		0.001
	2021		0.23		0.007		0.001
D	2022	188250	0.25	0.00012	0.007	0.0000182	0.001

1. Emissions follow the methodology from AP-42 Chapter 11.9.

Emissions from Road Dust

Alternative	Year	PM10	PM2.5
A	2014	2.10	0.53
	2015	11.79	2.95
	2016	14.48	3.62
	2017	4.55	1.14
	2018	8.27	2.07
	2019	18.35	4.59
	2020	27.94	6.98
	2021	34.17	8.54
	2022	24.82	6.20
	2023	17.75	4.44
B	2014	2.27	0.57
	2015	17.01	4.25
	2016	12.21	3.05
	2017	4.62	1.16
	2018	9.19	2.30
	2019	16.62	4.15
	2020	25.46	6.37
	2021	31.51	7.88
	2022	23.85	5.96
	2023	12.62	3.16
C	2014	2.10	0.53
	2015	11.79	2.95
	2016	14.48	3.62
	2017	4.55	1.14
	2018	2.78	0.69
	2019	9.90	2.48
	2020	23.48	5.87
	2021	15.68	3.92
	2022	16.88	4.22
D	2014	2.27	0.57
	2015	17.01	4.25
	2016	12.21	3.05
	2017	4.62	1.16
	2018	4.52	1.13
	2019	9.90	2.48
	2020	23.48	5.87
	2021	15.68	3.92
	2022	16.88	4.22

1. Emissions follow AP-42 Chpater 2.1.

Total Construction Emissions

Alternative	Year	CO	NOx	VOC	SOx	PM_{10}	$PM_{2.5}$	CO_2e
		Tons per Year						Metric Tons per Year
A	2014	23.55	64.19	4.15	0.11	7.38	4.13	9,955.49
	2015	72.04	195.21	12.75	0.32	25.61	12.89	30,389.80
	2016	69.41	189.77	12.35	0.32	27.75	13.37	29,852.94
	2017	56.92	156.82	9.90	0.27	12.58	7.80	25,610.65
	2018	56.13	157.85	9.97	0.26	20.00	10.45	24,818.31
	2019	159.90	452.95	28.33	0.78	43.76	25.08	72,808.90
	2020	162.53	459.30	28.84	0.78	54.58	28.04	73,411.44
	2021	161.09	455.85	28.58	0.78	59.46	28.95	73,096.55
	2022	158.78	450.30	28.12	0.77	48.33	25.64	72,538.28
	2023	142.67	405.41	25.16	0.70	38.35	21.68	65,689.97
B	2014	23.93	65.03	4.23	0.11	7.80	4.30	10,034.02
	2015	72.58	196.72	12.90	0.32	30.96	14.28	30,517.83
	2016	68.04	186.45	12.10	0.31	24.65	12.39	29,499.90
	2017	61.92	170.46	10.75	0.30	13.40	8.41	27,836.76
	2018	77.79	217.02	13.71	0.37	23.90	13.19	34,530.01
	2019	148.26	419.12	26.26	0.72	40.32	23.21	67,323.04
	2020	148.44	419.42	26.28	0.72	48.37	24.88	67,310.26
	2021	147.04	415.97	26.02	0.71	53.86	26.22	66,996.55
	2022	147.55	417.62	26.16	0.72	45.26	23.79	67,210.76
	2023	107.73	305.59	18.98	0.53	28.18	16.16	49,540.51
C	2014	23.55	64.19	4.15	0.11	7.38	4.13	9,955.49
	2015	72.04	195.21	12.75	0.32	25.60	12.89	30,389.80
	2016	69.41	189.77	12.35	0.32	27.75	13.37	29,852.94
	2017	56.92	156.82	9.90	0.27	12.58	7.80	25,610.65
	2018	34.45	95.96	6.06	0.16	9.05	5.39	15,293.54
	2019	107.77	299.92	19.20	0.50	30.11	17.63	47,318.66
	2020	107.18	298.62	19.14	0.50	42.03	20.21	47,245.06
	2021	104.99	292.83	18.62	0.50	32.74	17.29	46,587.00
	2022	100.28	281.06	17.67	0.48	31.74	16.41	45,342.60
D	2014	23.93	65.03	4.23	0.11	7.80	4.30	10,034.02
	2015	72.58	196.72	12.90	0.32	30.95	14.28	30,517.83
	2016	68.04	186.45	12.10	0.31	24.65	12.39	29,499.90
	2017	61.92	170.46	10.75	0.30	13.40	8.41	27,836.76
	2018	59.99	166.39	10.49	0.29	14.35	8.82	26,832.90
	2019	107.77	299.92	19.20	0.50	30.11	17.63	47,318.66
	2020	107.18	298.62	19.14	0.50	42.02	20.21	47,245.06
	2021	104.99	292.83	18.62	0.50	32.73	17.29	46,587.00
	2022	100.28	281.06	17.67	0.48	31.74	16.41	45,342.60
CEQA Threshold		100	10	10	27	15	15	NA
General Conformity de minimis Threshold		NA	10	10	NA	100	100	NA

1. Offroad PM is assumed to be the same for PM_{10} and $PM_{2.5}$.
2. Highlighted values exceed the CEQA Threshold.

Total Operational Emissions

Alternative	CO	NOx	VOC	SOx	PM10 Exhaust	PM10 Fugitive	PM10 Total	PM2.5 Exhaust	PM2.5 Fugitive	PM2.5 Total	CO2	CH4	CO2e
	tons										Metric Tons		
A	0.032	0.004	0.002	0.0001	0.0005	0.024	0.0243	0.0003	0.006	0.0062	5.21	0.00027	5.21
B	0.032	0.004	0.002	0.0001	0.0005	0.025	0.0256	0.0003	0.006	0.0066	5.21	0.00027	5.21
C	0.032	0.004	0.002	0.0001	0.0005	0.025	0.0257	0.0003	0.006	0.0066	5.21	0.00027	5.21
D	0.031	0.004	0.002	0.0001	0.0005	0.026	0.0262	0.0003	0.006	0.0067	5.01	0.00026	5.02
CEQA Threshold	100	10	10	27	NA	NA	15	NA	NA	15	NA	NA	NA
General Conformity de minimis Threshold	NA	10	10	NA	NA	NA	100	NA	NA	100	NA	NA	NA

Notes:

1. Trips and trip length is based on information provided by DWR and is consistent with traffic section assumptions.
2. Emission factors are based on EMFAC 2007 for 2014.
3. Fugitive dust emissions are from travel on paved roads based on AP-42 Chapter 13.1.

Operational Vehicle Trips and Trip Length

Alternative	Location	Activity	Trips/Activity	Frequency of Activity	Note	Total Trips	VMT
A	South Canal - river side control structure	Inspection of gates, seals	2	12	1	24	840
A	South Canal - river side control structure	Make adjustments	2	12	1	24	840
A	South Canal - river side control structure	Assessment after flows	2	12	1	24	840
A	South Canal - river side control structure	Inspection of ladder	2	12	1	24	840
A	South Canal - canal side control structure	Inspection of gates, seals	2	12	1	24	840
A	South Canal - canal side control structure	Make adjustments	2	12	1	24	840
A	South Canal - canal side control structure	Assessment after flows	2	12	1	24	840
A	San Mateo Avenue	Road closure	2	2		4	140
A	Screens Estimate	Inspections, flow verification, clear debris	2	120		240	8400
A	Screens Estimate	Velocity measurements	4	8		32	1120
A	Barriers Estimate	Inspection, flow verification, clear debris	2	120		240	8400
A	Barriers Estimate	Install/Remove barrier screens	4	10		40	1400
A	South Canal - river side control structure	Sediment removal from channel	4	2		8	280
A	South Canal - river side control structure	Lube gates	4	1		4	140
A	South Canal - river side control structure	Fish Ladder Cleaning	4	12	1	48	1680
A	South Canal - river side control structure	Fish attraction pipeline Cleaning	4	12	1	48	1680
A	South Canal - canal side control structure	Sediment removal from channel	8	5		40	1400
A	South Canal - canal side control structure	Lube gates	4	1		4	140
A	South Canal - canal side control structure	Channel Survey	8	5		40	1400
A	South Canal - canal side control structure	Channel reshaping	8	5		40	1400
A	San Mateo Avenue	Cleaning out culverts	8	2		16	560
A	San Mateo Avenue	Cleaning of debris off roadway	4	12	1	48	1680
A	Screens Estimate	Sediment removal from channel	4	2		8	280
A	Screens Estimate	Screens removal for cleaning	6	2		12	420
A	Screens Estimate	Screens removal for cleaning	2	2		4	140
A	Screens Estimate	Screens removal for cleaning	2	2		4	140
A	Screens Estimate	Grease and inspect pump/motor	4	12		48	1680
A	Screens Estimate	Brush inspection	4	12		48	1680
A	Screens Estimate	Trash Rack	4	12		48	1680
B	South Canal - river side control structure	Inspection of gates, seals	2	12	1	24	840
B	South Canal - river side control structure	Make adjustments	2	12	1	24	840
B	South Canal - river side control structure	Assessment after flows	2	12	1	24	840
B	South Canal - river side control structure	Inspection of ladder	2	12	1	24	840
B	South Canal - canal side control structure	Inspection of gates, seals	2	12	1	24	840
B	South Canal - canal side control structure	Make adjustments	2	12	1	24	840
B	South Canal - canal side control structure	Assessment after flows	2	12	1	24	840
B	San Mateo Avenue	Road closure	2	2		4	140
B	Chowchilla - river side control structure	Inspection of gates, seals	2	12	1	24	840
B	Chowchilla - river side control structure	Make adjustments	2	12	1	24	840
B	Chowchilla - river side control structure	Assessment after flows	2	12	1	24	840
B	Chowchilla - river side control structure	Inspection of ladder	2	12	1	24	840
B	Screens Estimate	Inspections, flow verification, clear debris	2	120		240	8400
B	Screens Estimate	Velocity measurements	4	8		32	1120
B	Barriers Estimate	Inspection, flow verification, clear debris	2	120		240	8400
B	Barriers Estimate	Install/Remove barrier screens	4	10		40	1400
B	Bifurcation - river side control structure	Sediment removal from channel	4	2		8	280
B	Bifurcation - river side control structure	Lube gates	4	1		4	140

Operational Vehicle Trips and Trip Length

Alternative	Location	Activity	Trips/Activity	Frequency of Activity	Note	Total Trips	VMT
B	Bifurcation - river side control structure	Fish Ladder Cleaning	4	12	1	48	1680
B	Bifurcation - river side control structure	Fish attraction pipeline Cleaning	4	12	1	48	1680
B	Bifurcation - canal side control structure	Sediment removal from channel	8	1		8	280
B	Bifurcation - canal side control structure	Lube gates	4	1		4	140
B	Bifurcation - canal side control structure	Channel Survey	8	5		40	1400
B	Bifurcation - canal side control structure	Channel reshaping	8	5		40	1400
B	San Mateo Avenue	Cleaning out culverts	8	2		16	560
B	San Mateo Avenue	Cleaning of debris off roadway	4	12	1	48	1680
B	Screens Estimate	Sediment removal from channel	4	2		8	280
B	Screens Estimate	Screens removal for cleaning	6	2		12	420
B	Screens Estimate	Screens removal for cleaning	2	2		4	140
B	Screens Estimate	Screens removal for cleaning	2	2		4	140
B	Screens Estimate	Grease and inspect pump/motor	4	12		48	1680
B	Screens Estimate	Brush inspection	4	12		48	1680
B	Screens Estimate	Trash Rack	4	12		48	1680
C	Fresno Slough Dam Estimate	Inspection of gates, seals	2	12	1	24	840
C	Fresno Slough Dam Estimate	Make adjustments	2	12	1	24	840
C	Fresno Slough Dam Estimate	Monitor for seepage	2	12	1	24	840
C	Short Canal - canal side control structure	Inspection of gates, seals	2	12	1	24	840
C	Short Canal - canal side control structure	Make adjustments	2	12	1	24	840
C	Short Canal - canal side control structure	Assessment after flows	2	12	1	24	840
C	Mendota Dam	Installation/Removal of Flashboards	2	12	1	24	840
C	Mendota Dam	Make adjustments	2	12	1	24	840
C	Mendota Dam	Installation/Removal of Flashboards	2	12	1	24	840
C	Mendota Dam	Make adjustments	2	12	1	24	840
C	Mendota Dam	Assessment after flows	2	12	1	24	840
C	Mendota Dam	Inspection of ladder	2	12	1	24	840
C	San Mateo Avenue	Road closure	2	2		4	140
C	Chowchilla - river side control structure	Inspection of gates, seals	2	12	1	24	840
C	Chowchilla - river side control structure	Make adjustments	2	12	1	24	840
C	Chowchilla - river side control structure	Assessment after flows	2	12	1	24	840
C	Chowchilla - river side control structure	Inspection of ladder	2	12	1	24	840
C	Screens Estimate	Inspections, flow verification, clear debris	2	120		240	8400
C	Screens Estimate	Velocity measurements	4	8		32	1120
C	Barriers Estimate	Inspection, flow verification, clear debris	2	120		240	8400
C	Barriers Estimate	Install/Remove barrier screens	4	10		40	1400
C	Fresno Slough Dam Estimate	Sediment removal from channel	4	2		8	280
C	Fresno Slough Dam Estimate	Lube gates	4	1		4	140
C	Short Canal - canal side control structure	Sediment removal from channel	8	5		40	1400
C	Short Canal - canal side control structure	Lube gates	4	1		4	140
C	San Mateo Avenue	Cleaning out culverts	8	2		16	560
C	San Mateo Avenue	Cleaning of debris off roadway	4	12	1	48	1680
C	Chowchilla Bifurcation Structure Estimate	Sediment removal from channel	8	2		16	560
C	Chowchilla Bifurcation Structure Estimate	Lube gates	8	1		8	280
C	Mendota Dam	Fish Ladder Cleaning	4	12	1	48	1680
C	Mendota Dam	Sediment removal from channel	4	2		8	280
C	Screens Estimate	Sediment removal from channel	4	2		8	280
C	Screens Estimate	Screens removal for cleaning	6	2		12	420

Operational Vehicle Trips and Trip Length

Alternative	Location	Activity	Trips/Activity	Frequency of Activity	Note	Total Trips	VMT
C	Screens Estimate	Screens removal for cleaning	2	2		4	140
C	Screens Estimate	Screens removal for cleaning	2	2		4	140
C	Screens Estimate	Grease and inspect pump/motor	4	12		48	1680
C	Screens Estimate	Brush inspection	4	12		48	1680
C	Screens Estimate	Trash Rack	4	12		48	1680
D	Fresno Slough Dam Estimate	Inspection of gates, seals	2	12	1	24	840
D	Fresno Slough Dam Estimate	Make adjustments	2	12	1	24	840
D	Fresno Slough Dam Estimate	Monitor for seepage	2	12	1	24	840
D	Mendota Dam	Inspection of ladder	2	12	1	24	840
D	North Canal - river side control structure	Inspection of gates, seals	2	12	1	24	840
D	North Canal - river side control structure	Make adjustments	2	12	1	24	840
D	North Canal - river side control structure	Assessment after flows	2	12	1	24	840
D	North Canal - river side control structure	Inspection of ladder	2	12	1	24	840
D	North Canal - canal side control structure	Inspection of gates, seals	2	12	1	24	840
D	North Canal - canal side control structure	Make adjustments	2	12	1	24	840
D	North Canal - canal side control structure	Assessment after flows	2	12	1	24	840
D	Screens Estimate	Inspections, flow verification, clear debris	2	120		240	8400
D	Screens Estimate	Velocity measurements	4	8		32	1120
D	Barriers Estimate	Inspection, flow verification, clear debris	2	120		240	8400
D	Barriers Estimate	Install/Remove barrier screens	4	10		40	1400
D	Fresno Slough Dam Estimate	Sediment removal from channel	4	2		8	280
D	Fresno Slough Dam Estimate	Lube gates	4	1		4	140
D	North Canal - river side control structure	Sediment removal from channel	4	2		8	280
D	North Canal - river side control structure	Lube gates	4	1		4	140
D	North Canal - river side control structure	Fish Ladder Cleaning	4	12	1	48	1680
D	North Canal - river side control structure	Fish attraction pipeline Cleaning	4	12	1	48	1680
D	North Canal - canal side control structure	Sediment removal from channel	8	5		40	1400
D	North Canal - canal side control structure	Lube gates	4	1		4	140
D	North Canal - canal side control structure	Channel Survey	8	5		40	1400
D	North Canal - canal side control structure	Channel reshaping	8	5		40	1400
D	Mendota Dam	Fish Ladder Cleaning	4	12	1	48	1680
D	Mendota Dam	Sediment removal from channel	4	2		8	280
D	Screens Estimate	Sediment removal from channel	4	2		8	280
D	Screens Estimate	Screens removal for cleaning	6	2		12	420
D	Screens Estimate	Screens removal for cleaning	2	2		4	140
D	Screens Estimate	Screens removal for cleaning	2	2		4	140
D	Screens Estimate	Grease and inspect pump/motor	4	12		48	1680
D	Screens Estimate	Brush inspection	4	12		48	1680
D	Screens Estimate	Trash Rack	4	12		48	1680

Notes:

1. Trips are based on information provided by DWR and the Project Description. For those designated with a note of 1 these did not specify a frequency and the frequency was assumed to average once per month.
2. Trip length was assumed to be 35 miles which is the approximate distance from Madera or Fresno.

Annual Average Concentration of DPM at Maximum Exposed Sensitive Receptor

Alternative	Receptor Type	UTMX	UTMY	Year	Concentration (ug/m^3)
A		733752	4071015	2014	0.018
A		733752	4071015	2015	0.055
A		733752	4071015	2016	0.055
A		733752	4071015	2017	0.047
A		733752	4071015	2018	0.042
A		733752	4071015	2019	0.124
A		733752	4071015	2020	0.125
A		733752	4071015	2021	0.125
A		733752	4071015	2022	0.124
A	School Child	733752	4071015	2023	0.112
A		739738	4072804	2014	0.039
A		739738	4072804	2015	0.115
A		739738	4072804	2016	0.113
A		739738	4072804	2017	0.065
A		739738	4072804	2018	0.055
A		739738	4072804	2019	0.163
A		739738	4072804	2020	0.188
A		739738	4072804	2021	0.182
A		739738	4072804	2022	0.168
A	Resident Child	739738	4072804	2023	0.151
B		733752	4071015	2014	0.018
B		733752	4071015	2015	0.054
B		733752	4071015	2016	0.052
B		733752	4071015	2017	0.050
B		733752	4071015	2018	0.059
B		733752	4071015	2019	0.111
B		733752	4071015	2020	0.111
B		733752	4071015	2021	0.110
B		733752	4071015	2022	0.110
B	School Child	733752	4071015	2023	0.082
B		739738	4072804	2014	0.046
B		739738	4072804	2015	0.130
B		739738	4072804	2016	0.116
B		739738	4072804	2017	0.073
B		739738	4072804	2018	0.096
B		739738	4072804	2019	0.150
B		739738	4072804	2020	0.166
B		739738	4072804	2021	0.160
B		739738	4072804	2022	0.154
B	Resident Child	739738	4072804	2023	0.113
C		733752	4071015	2014	0.018
C		733752	4071015	2015	0.055
C		733752	4071015	2016	0.055
C		733752	4071015	2017	0.047

C		733752	4071015	2018	0.025
C		733752	4071015	2019	0.078
C		733752	4071015	2020	0.078
C		733752	4071015	2021	0.077
C	School Child	733752	4071015	2022	0.075
C		739738	4072804	2014	0.039
C		739738	4072804	2015	0.115
C		739738	4072804	2016	0.113
C		739738	4072804	2017	0.065
C		739738	4072804	2018	0.046
C		739738	4072804	2019	0.141
C		739738	4072804	2020	0.108
C		739738	4072804	2021	0.102
C	Resident Child	739738	4072804	2022	0.102
D		733752	4071015	2014	0.018
D		733752	4071015	2015	0.054
D		733752	4071015	2016	0.052
D		733752	4071015	2017	0.050
D		733752	4071015	2018	0.046
D		733752	4071015	2019	0.078
D		733752	4071015	2020	0.078
D		733752	4071015	2021	0.078
D	School Child	733752	4071015	2022	0.075
D		739738	4072804	2014	0.045
D		739738	4072804	2015	0.127
D		739738	4072804	2016	0.114
D		739738	4072804	2017	0.073
D		739738	4072804	2018	0.077
D		739738	4072804	2019	0.147
D		739738	4072804	2020	0.168
D		739738	4072804	2021	0.168
D	Resident Child	739738	4072804	2022	0.109

Health Impacts at Maximally Exposed Sensitive Receptor

Receptor Type	Alternative	UTM X (m)	UTM Y (m)	Maximum Cancer Risk at Receptor in a million	Chronic HI
	A			77.36	0.04
	B			78.40	0.03
	C			61.60	0.03
Resident Child	D	739738	4072804	70.80	0.03
	A			60.30	0.03
	B			54.99	0.02
	C			37.03	0.02
School Child	D	733752	4071015	38.43	0.02

Notes:

1. The risk is based on a cancer potency factor for DPM of 1.1. Individual years concentration and age specific factors were used to arrive at the total risk.

2. The Chronic HI is based on a REL for DPM of 5. The year with the highest concentration was used to calculate HI.

Health Risk Assessment Exposure and Toxicity Values

Population	Year	Age	DBR	EF	TAF	CF	A	ED	AT	ASF
	2014		361	350	1	0.000001	1	1	25550	10
	2015	1	1090	350	1	0.000001	1	1	25550	10
	2016	2	1090	350	1	0.000001	1	1	25550	10
	2017	3	861	350	1	0.000001	1	1	25550	3
	2018	4	861	350	1	0.000001	1	1	25550	3
	2019	5	861	350	1	0.000001	1	1	25550	3
	2020	6	861	350	1	0.000001	1	1	25550	3
	2021	7	861	350	1	0.000001	1	1	25550	3
	2022	8	861	350	1	0.000001	1	1	25550	3
Resident Child	2023	9	861	350	1	0.000001	1	1	25550	3
	2014		745	180	4.2	0.000001	1	1	25550	3
	2015		745	180	4.2	0.000001	1	1	25550	3
	2016		745	180	4.2	0.000001	1	1	25550	3
	2017		745	180	4.2	0.000001	1	1	25550	3
	2018		745	180	4.2	0.000001	1	1	25550	3
	2019		745	180	4.2	0.000001	1	1	25550	3
	2020		745	180	4.2	0.000001	1	1	25550	3
	2021		745	180	4.2	0.000001	1	1	25550	3
	2022		745	180	4.2	0.000001	1	1	25550	3
School Child	2023		745	180	4.2	0.000001	1	1	25550	3

1. Values for exposure are based on recommendations from OEHHA 2012.

Model Source Parameters

Source ID	Location Type	Model Source Type	Number of Sources	Emission Rate	Length of Side	Release Height	Initial Lateral Dimension	Initial Vertical Dimension
CCANAL	Construction Area	Volume	589	0.0017	100	5	23.26	1.4
CHILLA	Construction Area	Volume	56	0.0179	100	5	23.26	1.4
CNS	Construction Area	Volume	254	0.0039	400	5	93.02	1.4
CWB	Construction Area	Volume	412	0.0024	400	5	93.02	1.4
FNS	Construction Area	Volume	272	0.0037	400	5	93.02	1.4
FSDC	Construction Area	Volume	989	0.0010	100	5	23.26	1.4
FWN	Construction Area	Volume	368	0.0027	400	5	93.02	1.4
LONE	Construction Area	Volume	4	0.2500	100	5	23.26	1.4
NCANAL	Construction Area	Volume	1044	0.0010	100	5	23.26	1.4
SCANAL	Construction Area	Volume	711	0.0014	100	5	23.26	1.4
SMCROSS	Construction Area	Volume	35	0.0286	100	5	23.26	1.4
BASS	Road	Volume	145	0.0069	13.5	2.55	6.28	2.37
EHI180	Road	Volume	239	0.0042	13.5	2.55	6.28	2.37
HI180	Road	Volume	606	0.0017	13.5	2.55	6.28	2.37
NORTH33	Road	Volume	116	0.0086	13.5	2.55	6.28	2.37
OVERLAP	Road	Volume	32	0.0313	13.5	2.55	6.28	2.37
SANMATEO	Road	Volume	318	0.0031	13.5	2.55	6.28	2.37
SOUTH33	Road	Volume	235	0.0043	13.5	2.55	6.28	2.37

Notes:

1. Construction areas were modeled as adjacent volume sources to cover the area contained by construciton activities
2. Roads were modeled as adjacent volume sources with a road width of 7.5 meters and 6 meter buffer.

Sensitive Receptors

UTM X (meter)	UTM Y (Meter)	Name	Type
733694	4071080	Washington Elementary	School Child
733752	4071015	Washington Elementary	School Child
733538	4070955	Washington Elementary	School Child
733603	4070867	Washington Elementary	School Child
734294	4070090	Mendota High	School Child
734235	4071367	Migrant Head Start	School Child
733005	4070881	Community Day	School Child
732939	4070783	HeadStart	School Child
733270	4071359	Mccabe	School Child
733256	4071101	Mccabe	School Child
736165	4076646	Resident	Resident Child
736142	4076652	Resident	Resident Child
736119	4076657	Resident	Resident Child
736101	4076662	Resident	Resident Child
736268	4076567	Resident	Resident Child
733522	4075870	Resident	Resident Child
733503	4075810	Resident	Resident Child
733490	4075730	Resident	Resident Child
733478	4075697	Resident	Resident Child
734427	4075111	Resident	Resident Child
7434094	4075470	Resident	Resident Child
733964	4075622	Resident	Resident Child
734243	4072940	Resident	Resident Child
734224	4072962	Resident	Resident Child
734188	4072900	Resident	Resident Child
7431177	4072824	Resident	Resident Child
734718	4073308	Resident	Resident Child
737247	4072216	Resident	Resident Child
735610	4074256	Resident	Resident Child
735610	4074256	Resident	Resident Child
738884	4071994	Resident	Resident Child
739812	4071686	Resident	Resident Child
739802	4072537	Resident	Resident Child
739762	4072580	Resident	Resident Child
739738	4072804	Resident	Resident Child
742097	4072010	Resident	Resident Child
734441	4075063	Resident	Resident Child
734441	4075077	Resident	Resident Child
734433	4075098	Resident	Resident Child

Mendota Pool Bypass and Reach 2B Improvements Project

Appendix 4-B

Draft
Environmental Impact Statement/Report

SAN JOAQUIN RIVER
RESTORATION PROGRAM

Draft
June 2015

Health Risk Assessment

The construction equipment and material hauling vehicles emit diesel particulate matter that is classified as a toxic air contaminant (TAC). Gasoline-fueled vehicles emit various TACs in much smaller quantities and health toxicity compared to diesel particulate matter (DPM). Thus, gasoline fueled emission sources have not been included further in this health risk assessment (HRA). The emissions of DPM sources are used in the HRA and the details of the emission rates used are contained in Appendix 4-A – Tables.

In order to evaluate the impacts of DPM on nearby sensitive receptors, a HRA was conducted consistent with the California Office of Environmental Health Hazard Assessment (OEHHA 2012, 2003) and San Joaquin Valley Air Pollution Control District guidelines (SJVAPCD 2006) for determining local community risks and hazards. The HRA evaluated the health risks associated with the Project emissions from construction equipment and material hauling vehicles.

Dispersion Modeling

The dispersion of emissions was simulated using the U.S. Environmental Protection Agency (EPA) regulatory approved model called AERMOD. The model inputs and assumptions are summarized below. AERMOD input files can be found in Appendix 4-C – AERMOD Input Files.

- **Meteorological Data:** AERMOD requires meteorological data as an input into the model. This is typically processed using AERMET, a pre-processor to AERMOD. AERMET requires surface meteorological data, upper air meteorological data and surface parameter data. The SJVAPCD has several meteorological data sets that have been processed using AERMET available on its website[1]. For this Project the pre-processed data for Fresno was utilized since it is one of the closest data sets available and has the most conservative wind speeds. Five years of meteorological data from 2005 through 2009 was utilized.
- **Terrain:** It was assumed that the terrain in the project was flat and therefore no terrain data was utilized.
- **Receptors:** Receptors were modeled using a Cartesian grid with 100 meter by 100 meter spacing as well as several discrete receptors. Receptors were modeled at a height of 1.8 meters.
- **Source Parameters:** Volume sources were utilized to model construction work areas. A work area was divided into adjacent volume sources with a release height of 5 meters. Roads were modeled using adjacent volume sources with a side length of 13.5 meters based on an average road width of 7.5 meters plus 6 feet buffer as recommended by EPA (EPA 2012). Sources were assumed to be rural sources. Details of source parameters are available in Appendix 4-A – Tables.

[1] In December of 2012, the EPA released a new version of AERMET and AERMOD which included some updates involving the meteorological data. At the time of preparation of this document, the SJVAPCD has not reprocessed the meteorological data sets. Communication with Glenn Reed at SJVAPCD recommended that users continue to use the older and currently available meteorological data sets with the new version of AERMOD until updated guidance has been provided by SJVAPCD (Reed 2013).

Exposure Factors

Potential sensitive receptors such as residents, school children, day cares, and hospitals were searched for in the vicinity of the Project. Schools and day cares were identified using data available from the San Joaquin Valley Unified Air Pollution Control District[2]. This information was also compared to information available for the City of Mendota from several State databases (Department of Education 2013, Automated Licensing Information and Report Tracking System 2013, and California Community Care Licensing Division 2013) which includes schools, day cares, and health care facilities. A search of key words using a web-based search engine verified that there were no additional schools, day cares, or health facilities in the area. There are a large number of residential houses located in the City of Mendota. There are a few isolated locations of residential units located closer to the Project vicinity. These were identified and added as discrete sensitive receptors to the air dispersion model. The maximally exposed residential or school receptor was reported.

The exposure parameters used for estimating excess lifetime cancer risks and chronic non-cancer Hazard Index (HI) for all potentially exposed populations were obtained using risk assessment guidelines from OEHHA, unless otherwise noted, and are presented in Appendix 4-A – Tables.

The inhalation dose is a function of the concentration of a chemical and the intake of that chemical. The dose can be calculated as follows:

Toxicity Assessment

The toxicity assessment characterizes the relationship between the magnitude of exposure and the nature and magnitude of adverse health effects that may result from such exposure. For purposes of calculating exposure criteria to be used in risk assessments, adverse health effects are classified into two broad categories: cancer and non-cancer endpoints. Toxicity values used to estimate the likelihood of adverse effects occurring in humans at different exposure levels are identified as part of the toxicity assessment component of a risk assessment.

In this HRA, diesel exhaust, a complex mixture that includes hundreds of individual constituents, is identified by the State as a known carcinogen is the only chemical of potential concern quantified. Under California regulatory guidelines, DPM is used as a surrogate measure of carcinogen exposure for the mixture of chemicals that make up diesel exhaust as a whole.

The estimated excess lifetime cancer risk for a resident child, daycare child, and school child were adjusted using the age sensitivity factors (ASFs) recommended by OEHHA (OEHHA 2009). This approach accounts for an "anticipated special sensitivity to carcinogens" of infants and children. Cancer risk estimates are weighted by a factor of 10 for exposures that occur from the third trimester of pregnancy to two years of age and by a factor of three for exposures that occur from two years through 15 years of age. No weighting factor (i.e. an ASF of one, which is equivalent to no adjustment) is applied to ages 16 to 70 years.

Risk Characterization

Excess lifetime cancer risks are estimated as the upper-bound incremental probability that an individual would develop cancer over a lifetime as a direct result of exposure to potential carcinogens. The estimated risk is expressed as a unitless probability. The cancer risk attributed to a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific cancer potency factor (CPF).

The equation used to calculate the potential excess lifetime cancer risk for the inhalation pathway is as follows:

(HQ). To evaluate the potential for adverse chronic non-cancer health effects from simultaneous exposure to multiple chemicals, the HQs for all chemicals are summed, yielding an HI. For evaluation of the Project, DPM is the only pollutant evaluated for chronic non-cancer risks; therefore the HQ for DPM is the same as the overall HI.

The equations used to calculate the chemical-specific HQs and the overall HI are:

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Mendota Pool Bypass and Reach 2B Improvements Project

Appendix 4-C

Draft
Environmental Impact Statement/Report

SAN JOAQUIN RIVER
RESTORATION PROGRAM

Draft
June 2015

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** AERMOD View Ver. 8.1.0
** Lakes Environmental Software Inc.
** Date: 2/22/2013
** File: C:\Lakes\AERMOD View\r2b\roads2\EHI180\EHI180.ADI
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**************************************
** AERMOD Control Pathway
**************************************
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   AVERTIME 1 ANNUAL
   POLLUTID OTHER
   FLAGPOLE 1.80
   RUNORNOT RUN
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CO FINISHED
**
**************************************
** AERMOD Source Pathway
**************************************
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** Source ID - Type - X Coord. - Y Coord. **
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** PREFIX EHI
** Length of Side = 13.50
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** SZINIT = 2.37
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** 743047.58, 4068857.19, 0.00, 2.55, 6.28
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   SRCGROUP EHI180   EHI00584 EHI00585 EHI00586 EHI00587 EHI00588
EHI00589
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EHI00607
   SRCGROUP EHI180   EHI00608 EHI00609 EHI00610 EHI00611 EHI00612
EHI00613
   SRCGROUP EHI180   EHI00614 EHI00615 EHI00616 EHI00617 EHI00618
EHI00619
   SRCGROUP EHI180   EHI00620 EHI00621 EHI00622 EHI00623 EHI00624
EHI00625
   SRCGROUP EHI180   EHI00626 EHI00627 EHI00628 EHI00629 EHI00630
EHI00631
   SRCGROUP EHI180   EHI00632 EHI00633 EHI00634 EHI00635 EHI00636
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   SRCGROUP EHI180   EHI00638 EHI00639 EHI00640 EHI00641 EHI00642
EHI00643
   SRCGROUP EHI180   EHI00644 EHI00645 EHI00646 EHI00647 EHI00648
EHI00649
   SRCGROUP EHI180   EHI00650 EHI00651 EHI00652 EHI00653 EHI00654
EHI00655
   SRCGROUP ALL
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** AERMOD Receptor Pathway
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RE STARTING
   GRIDCART UCART1 STA
                    XYINC 732500.00 104 100.00 4069400.00 81 100.00
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                    FLAG   78     1.80     1.80     1.80     1.80
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1.80     1.80
                    FLAG   79     1.80     1.80     1.80     1.80
1.80     1.80
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1.80      1.80
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1.80      1.80
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   GRIDCART UCART1 END
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   DISCCART    734441.00   4075077.00    0.00
   DISCCART    734433.00   4075098.00    0.00
RE FINISHED
**
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** AERMOD Meteorology Pathway
**************************************
**
**
ME STARTING
** Surface File Path: C:\Lakes\AERMOD View\r2b\roads2\EHI180\
   SURFFILE Fresno.SFC
** Profile File Path: C:\Lakes\AERMOD View\r2b\roads2\EHI180\
   PROFFILE Fresno.PFL
   SURFDATA 93193 2005 FRESNO/AIR_TERMINAL
   UAIRDATA 23230 2005 OAKLAND/WSO_AP
   SITEDATA 0 2005
   PROFBASE 101.0 METERS
ME FINISHED
**
**************************************
** AERMOD Output Pathway
**************************************
**
**
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 1ST
** Plotfile Path: C:\Lakes\AERMOD View\r2b\roads2\EHI180\EHI180.AD\
   PLOTFILE ANNUAL EHI180 EHI180.AD\EHI180_YR.PLT 31
   PLOTFILE 1 EHI180 1ST EHI180.AD\EHI180_1hr.PLT 32
   NOHEADER PLOTFILE
   FILEFORM EXP
   SUMMFILE EHI180.sum
OU FINISHED
**
**************************************
** Project Parameters
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** PROJCTN  CoordinateSystemUTM
** DESCPTN  UTM: Universal Transverse Mercator
** DATUM    North American Datum 1983
** DTMRGN   CONUS
** UNITS    m
** ZONE     10
** ZONEINX  0
**
```

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**
**************************************
**
** AERMOD Input Produced by:
** AERMOD View Ver. 8.1.0
** Lakes Environmental Software Inc.
** Date: 2/4/2013
** File: C:\Lakes\AERMOD View\r2b\roads\roads.inp
**
**************************************
**
**
**************************************
** AERMOD Control Pathway
**************************************
**
**
CO STARTING
   TITLEONE R2B ROADS
   MODELOPT CONC FLAT
   AVERTIME 1 ANNUAL
   POLLUTID OTHER
   FLAGPOLE 1.80
   RUNORNOT RUN
   SAVEFILE "C:\Lakes\AERMOD View\r2b\roads\roads.sv1" 1
** Error File Path: C:\Lakes\AERMOD View\r2b\roads\
   ERRORFIL R2B_ROADS.ERR
CO FINISHED
**
**************************************
** AERMOD Source Pathway
**************************************
**
**
SO STARTING
** Source Location **
** Source ID - Type - X Coord. - Y Coord. **
** ------------------------------------------------------------------------
** Line Source Represented by Adjacent Volume Sources
** LINE VOLUME Source ID = SOUTH
** DESCRSRC South hiway 33
** PREFIX S
** Length of Side = 13.50
** Configuration = Adjacent
** Emission Rate = 1.0
** Vertical Dimension = 5.10
** SZINIT = 2.37
** Nodes = 2
** 733270.00, 4071525.00, 0.00, 2.88, 6.28
** 733300.00, 4068350.00, 0.00, 2.88, 6.28
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   LOCATION S0000002     VOLUME   733270.191 4071504.751 0.0
   LOCATION S0000003     VOLUME   733270.319 4071491.252 0.0
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LOCATION S0000005     VOLUME   733270.574 4071464.253 0.0
LOCATION S0000006     VOLUME   733270.702 4071450.753 0.0
LOCATION S0000007     VOLUME   733270.829 4071437.254 0.0
LOCATION S0000008     VOLUME   733270.957 4071423.755 0.0
LOCATION S0000009     VOLUME   733271.084 4071410.255 0.0
LOCATION S0000010     VOLUME   733271.212 4071396.756 0.0
LOCATION S0000011     VOLUME   733271.339 4071383.256 0.0
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LOCATION S0000014     VOLUME   733271.722 4071342.758 0.0
LOCATION S0000015     VOLUME   733271.850 4071329.259 0.0
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LOCATION S0000017     VOLUME   733272.105 4071302.260 0.0
LOCATION S0000018     VOLUME   733272.232 4071288.761 0.0
LOCATION S0000019     VOLUME   733272.360 4071275.261 0.0
LOCATION S0000020     VOLUME   733272.487 4071261.762 0.0
LOCATION S0000021     VOLUME   733272.615 4071248.262 0.0
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LOCATION S0000198     VOLUME   733295.192 4068858.869 0.0
LOCATION S0000199     VOLUME   733295.319 4068845.370 0.0
LOCATION S0000200     VOLUME   733295.447 4068831.870 0.0
LOCATION S0000201     VOLUME   733295.574 4068818.371 0.0
LOCATION S0000202     VOLUME   733295.702 4068804.871 0.0
LOCATION S0000203     VOLUME   733295.830 4068791.372 0.0
LOCATION S0000204     VOLUME   733295.957 4068777.873 0.0
LOCATION S0000205     VOLUME   733296.085 4068764.373 0.0
LOCATION S0000206     VOLUME   733296.212 4068750.874 0.0
LOCATION S0000207     VOLUME   733296.340 4068737.374 0.0
LOCATION S0000208     VOLUME   733296.467 4068723.875 0.0
LOCATION S0000209     VOLUME   733296.595 4068710.376 0.0
LOCATION S0000210     VOLUME   733296.722 4068696.876 0.0
LOCATION S0000211     VOLUME   733296.850 4068683.377 0.0
LOCATION S0000212     VOLUME   733296.978 4068669.877 0.0
LOCATION S0000213     VOLUME   733297.105 4068656.378 0.0
LOCATION S0000214     VOLUME   733297.233 4068642.879 0.0
LOCATION S0000215     VOLUME   733297.360 4068629.379 0.0
LOCATION S0000216     VOLUME   733297.488 4068615.880 0.0
LOCATION S0000217     VOLUME   733297.615 4068602.380 0.0
LOCATION S0000218     VOLUME   733297.743 4068588.881 0.0
LOCATION S0000219     VOLUME   733297.870 4068575.382 0.0
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   LOCATION S0000220     VOLUME   733297.998 4068561.882 0.0
   LOCATION S0000221     VOLUME   733298.126 4068548.383 0.0
   LOCATION S0000222     VOLUME   733298.253 4068534.883 0.0
   LOCATION S0000223     VOLUME   733298.381 4068521.384 0.0
   LOCATION S0000224     VOLUME   733298.508 4068507.885 0.0
   LOCATION S0000225     VOLUME   733298.636 4068494.385 0.0
   LOCATION S0000226     VOLUME   733298.763 4068480.886 0.0
   LOCATION S0000227     VOLUME   733298.891 4068467.386 0.0
   LOCATION S0000228     VOLUME   733299.018 4068453.887 0.0
   LOCATION S0000229     VOLUME   733299.146 4068440.388 0.0
   LOCATION S0000230     VOLUME   733299.273 4068426.888 0.0
   LOCATION S0000231     VOLUME   733299.401 4068413.389 0.0
   LOCATION S0000232     VOLUME   733299.529 4068399.890 0.0
   LOCATION S0000233     VOLUME   733299.656 4068386.390 0.0
   LOCATION S0000234     VOLUME   733299.784 4068372.891 0.0
   LOCATION S0000235     VOLUME   733299.911 4068359.391 0.0
** End of LINE VOLUME Source ID = SOUTH
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** Line Source Represented by Adjacent Volume Sources
** LINE VOLUME Source ID = SLINE1
** DESCRSRC North 33
** PREFIX
** Length of Side = 13.50
** Configuration = Adjacent
** Emission Rate = 1.0
** Vertical Dimension = 5.10
** SZINIT = 2.37
** Nodes = 5
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** 733099.84, 4072160.22, 0.00, 2.55, 6.28
** 732848.46, 4072378.28, 0.00, 2.55, 6.28
** 732497.13, 4072862.88, 0.00, 2.55, 6.28
** 732254.84, 4073205.12, 0.00, 2.55, 6.28
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   LOCATION L0000238     VOLUME   733194.811 4071998.513 0.0
   LOCATION L0000239     VOLUME   733187.974 4072010.154 0.0
   LOCATION L0000240     VOLUME   733181.138 4072021.795 0.0
   LOCATION L0000241     VOLUME   733174.301 4072033.436 0.0
   LOCATION L0000242     VOLUME   733167.464 4072045.076 0.0
   LOCATION L0000243     VOLUME   733160.628 4072056.717 0.0
   LOCATION L0000244     VOLUME   733153.791 4072068.358 0.0
   LOCATION L0000245     VOLUME   733146.954 4072079.999 0.0
   LOCATION L0000246     VOLUME   733140.117 4072091.640 0.0
   LOCATION L0000247     VOLUME   733133.281 4072103.281 0.0
   LOCATION L0000248     VOLUME   733126.444 4072114.922 0.0
   LOCATION L0000249     VOLUME   733119.607 4072126.562 0.0
   LOCATION L0000250     VOLUME   733112.771 4072138.203 0.0
   LOCATION L0000251     VOLUME   733105.934 4072149.844 0.0
   LOCATION L0000252     VOLUME   733098.732 4072161.181 0.0
   LOCATION L0000253     VOLUME   733088.534 4072170.027 0.0
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   LOCATION L0000255     VOLUME   733068.138 4072187.720 0.0
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LOCATION L0000256 VOLUME 733057.941 4072196.566 0.0
LOCATION L0000257 VOLUME 733047.743 4072205.412 0.0
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LOCATION L0000259 VOLUME 733027.347 4072223.105 0.0
LOCATION L0000260 VOLUME 733017.150 4072231.951 0.0
LOCATION L0000261 VOLUME 733006.952 4072240.797 0.0
LOCATION L0000262 VOLUME 732996.754 4072249.643 0.0
LOCATION L0000263 VOLUME 732986.556 4072258.490 0.0
LOCATION L0000264 VOLUME 732976.359 4072267.336 0.0
LOCATION L0000265 VOLUME 732966.161 4072276.182 0.0
LOCATION L0000266 VOLUME 732955.963 4072285.028 0.0
LOCATION L0000267 VOLUME 732945.765 4072293.875 0.0
LOCATION L0000268 VOLUME 732935.568 4072302.721 0.0
LOCATION L0000269 VOLUME 732925.370 4072311.567 0.0
LOCATION L0000270 VOLUME 732915.172 4072320.413 0.0
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LOCATION L0000272 VOLUME 732894.777 4072338.106 0.0
LOCATION L0000273 VOLUME 732884.579 4072346.952 0.0
LOCATION L0000274 VOLUME 732874.381 4072355.798 0.0
LOCATION L0000275 VOLUME 732864.183 4072364.644 0.0
LOCATION L0000276 VOLUME 732853.986 4072373.491 0.0
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LOCATION L0000278 VOLUME 732836.905 4072394.221 0.0
LOCATION L0000279 VOLUME 732828.981 4072405.151 0.0
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LOCATION L0000281 VOLUME 732813.133 4072427.010 0.0
LOCATION L0000282 VOLUME 732805.209 4072437.940 0.0
LOCATION L0000283 VOLUME 732797.285 4072448.870 0.0
LOCATION L0000284 VOLUME 732789.361 4072459.800 0.0
LOCATION L0000285 VOLUME 732781.437 4072470.729 0.0
LOCATION L0000286 VOLUME 732773.513 4072481.659 0.0
LOCATION L0000287 VOLUME 732765.589 4072492.589 0.0
LOCATION L0000288 VOLUME 732757.665 4072503.519 0.0
LOCATION L0000289 VOLUME 732749.741 4072514.448 0.0
LOCATION L0000290 VOLUME 732741.817 4072525.378 0.0
LOCATION L0000291 VOLUME 732733.893 4072536.308 0.0
LOCATION L0000292 VOLUME 732725.969 4072547.237 0.0
LOCATION L0000293 VOLUME 732718.044 4072558.167 0.0
LOCATION L0000294 VOLUME 732710.120 4072569.097 0.0
LOCATION L0000295 VOLUME 732702.196 4072580.027 0.0
LOCATION L0000296 VOLUME 732694.272 4072590.956 0.0
LOCATION L0000297 VOLUME 732686.348 4072601.886 0.0
LOCATION L0000298 VOLUME 732678.424 4072612.816 0.0
LOCATION L0000299 VOLUME 732670.500 4072623.746 0.0
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LOCATION L0000303 VOLUME 732638.804 4072667.465 0.0
LOCATION L0000304 VOLUME 732630.880 4072678.394 0.0
LOCATION L0000305 VOLUME 732622.956 4072689.324 0.0
LOCATION L0000306 VOLUME 732615.032 4072700.254 0.0
LOCATION L0000307 VOLUME 732607.108 4072711.184 0.0
LOCATION L0000308 VOLUME 732599.184 4072722.113 0.0
LOCATION L0000309 VOLUME 732591.259 4072733.043 0.0

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   LOCATION L0000310     VOLUME   732583.335 4072743.973 0.0
   LOCATION L0000311     VOLUME   732575.411 4072754.903 0.0
   LOCATION L0000312     VOLUME   732567.487 4072765.832 0.0
   LOCATION L0000313     VOLUME   732559.563 4072776.762 0.0
   LOCATION L0000314     VOLUME   732551.639 4072787.692 0.0
   LOCATION L0000315     VOLUME   732543.715 4072798.622 0.0
   LOCATION L0000316     VOLUME   732535.791 4072809.551 0.0
   LOCATION L0000317     VOLUME   732527.867 4072820.481 0.0
   LOCATION L0000318     VOLUME   732519.943 4072831.411 0.0
   LOCATION L0000319     VOLUME   732512.019 4072842.340 0.0
   LOCATION L0000320     VOLUME   732504.095 4072853.270 0.0
   LOCATION L0000321     VOLUME   732496.186 4072864.211 0.0
   LOCATION L0000322     VOLUME   732488.385 4072875.229 0.0
   LOCATION L0000323     VOLUME   732480.585 4072886.247 0.0
   LOCATION L0000324     VOLUME   732472.784 4072897.265 0.0
   LOCATION L0000325     VOLUME   732464.984 4072908.284 0.0
   LOCATION L0000326     VOLUME   732457.183 4072919.302 0.0
   LOCATION L0000327     VOLUME   732449.383 4072930.320 0.0
   LOCATION L0000328     VOLUME   732441.582 4072941.338 0.0
   LOCATION L0000329     VOLUME   732433.781 4072952.357 0.0
   LOCATION L0000330     VOLUME   732425.981 4072963.375 0.0
   LOCATION L0000331     VOLUME   732418.180 4072974.393 0.0
   LOCATION L0000332     VOLUME   732410.380 4072985.411 0.0
   LOCATION L0000333     VOLUME   732402.579 4072996.430 0.0
   LOCATION L0000334     VOLUME   732394.779 4073007.448 0.0
   LOCATION L0000335     VOLUME   732386.978 4073018.466 0.0
   LOCATION L0000336     VOLUME   732379.178 4073029.484 0.0
   LOCATION L0000337     VOLUME   732371.377 4073040.503 0.0
   LOCATION L0000338     VOLUME   732363.577 4073051.521 0.0
   LOCATION L0000339     VOLUME   732355.776 4073062.539 0.0
   LOCATION L0000340     VOLUME   732347.976 4073073.557 0.0
   LOCATION L0000341     VOLUME   732340.175 4073084.576 0.0
   LOCATION L0000342     VOLUME   732332.375 4073095.594 0.0
   LOCATION L0000343     VOLUME   732324.574 4073106.612 0.0
   LOCATION L0000344     VOLUME   732316.774 4073117.630 0.0
   LOCATION L0000345     VOLUME   732308.973 4073128.649 0.0
   LOCATION L0000346     VOLUME   732301.172 4073139.667 0.0
   LOCATION L0000347     VOLUME   732293.372 4073150.685 0.0
   LOCATION L0000348     VOLUME   732285.571 4073161.703 0.0
   LOCATION L0000349     VOLUME   732277.771 4073172.722 0.0
   LOCATION L0000350     VOLUME   732269.970 4073183.740 0.0
   LOCATION L0000351     VOLUME   732262.170 4073194.758 0.0
** End of LINE VOLUME Source ID = SLINE1
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** Line Source Represented by Adjacent Volume Sources
** LINE VOLUME Source ID = OVERLAP
** DESCRSRC
** PREFIX OVER
** Length of Side = 13.50
** Configuration = Adjacent
** Emission Rate = 1.0
** Vertical Dimension = 5.10
** SZINIT = 2.37
** Nodes = 3
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   LOCATION OVER0385     VOLUME   733220.416 4071938.274 0.0
   LOCATION OVER0386     VOLUME   733223.573 4071925.148 0.0
   LOCATION OVER0387     VOLUME   733226.731 4071912.023 0.0
   LOCATION OVER0388     VOLUME   733229.888 4071898.897 0.0
   LOCATION OVER0389     VOLUME   733233.045 4071885.772 0.0
   LOCATION OVER0390     VOLUME   733236.203 4071872.646 0.0
   LOCATION OVER0391     VOLUME   733239.360 4071859.521 0.0
   LOCATION OVER0392     VOLUME   733242.518 4071846.395 0.0
   LOCATION OVER0393     VOLUME   733245.675 4071833.269 0.0
   LOCATION OVER0394     VOLUME   733248.832 4071820.144 0.0
   LOCATION OVER0395     VOLUME   733251.990 4071807.018 0.0
   LOCATION OVER0396     VOLUME   733255.147 4071793.893 0.0
   LOCATION OVER0397     VOLUME   733258.304 4071780.767 0.0
   LOCATION OVER0398     VOLUME   733261.462 4071767.641 0.0
   LOCATION OVER0399     VOLUME   733264.619 4071754.516 0.0
   LOCATION OVER0400     VOLUME   733267.776 4071741.390 0.0
   LOCATION OVER0401     VOLUME   733269.685 4071728.089 0.0
   LOCATION OVER0402     VOLUME   733270.260 4071714.602 0.0
   LOCATION OVER0403     VOLUME   733270.835 4071701.114 0.0
   LOCATION OVER0404     VOLUME   733271.410 4071687.626 0.0
   LOCATION OVER0405     VOLUME   733271.985 4071674.138 0.0
   LOCATION OVER0406     VOLUME   733272.560 4071660.651 0.0
   LOCATION OVER0407     VOLUME   733273.135 4071647.163 0.0
   LOCATION OVER0408     VOLUME   733273.710 4071633.675 0.0
   LOCATION OVER0409     VOLUME   733274.285 4071620.187 0.0
   LOCATION OVER0410     VOLUME   733274.860 4071606.700 0.0
   LOCATION OVER0411     VOLUME   733275.435 4071593.212 0.0
   LOCATION OVER0412     VOLUME   733276.010 4071579.724 0.0
   LOCATION OVER0413     VOLUME   733276.585 4071566.236 0.0
   LOCATION OVER0414     VOLUME   733277.160 4071552.749 0.0
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** End of LINE VOLUME Source ID = OVERLAP
   LOCATION BASS01       VOLUME     733232.940  4071956.770          0.0
   LOCATION BASS02       VOLUME     733246.140  4071959.630          0.0
   LOCATION BASS03       VOLUME     733259.340  4071962.480          0.0
   LOCATION BASS04       VOLUME     733272.530  4071965.330          0.0
   LOCATION BASS05       VOLUME     733285.730  4071968.180          0.0
   LOCATION BASS06       VOLUME     733298.920  4071971.030          0.0
   LOCATION BASS07       VOLUME     733312.120  4071973.880          0.0
   LOCATION BASS08       VOLUME     733325.310  4071976.730          0.0
   LOCATION BASS09       VOLUME     733338.510  4071979.580          0.0
   LOCATION BASS10       VOLUME     733351.700  4071982.430          0.0
   LOCATION BASS11       VOLUME     733364.900  4071985.280          0.0
   LOCATION BASS12       VOLUME     733378.100  4071988.140          0.0
   LOCATION BASS13       VOLUME     733391.290  4071990.990          0.0
   LOCATION BASS14       VOLUME     733404.490  4071993.840          0.0
   LOCATION BASS15       VOLUME     733417.680  4071996.690          0.0
   LOCATION BASS16       VOLUME     733430.880  4071999.540          0.0
   LOCATION BASS17       VOLUME     733444.070  4072002.390          0.0
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LOCATION	BASS18	VOLUME	733457.270	4072005.240	0.0
LOCATION	BASS19	VOLUME	733470.460	4072008.090	0.0
LOCATION	BASS20	VOLUME	733483.660	4072010.940	0.0
LOCATION	BASS21	VOLUME	733496.860	4072013.800	0.0
LOCATION	BASS22	VOLUME	733510.050	4072016.650	0.0
LOCATION	BASS23	VOLUME	733523.250	4072019.500	0.0
LOCATION	BASS24	VOLUME	733536.440	4072022.350	0.0
LOCATION	BASS25	VOLUME	733549.640	4072025.200	0.0
LOCATION	BASS26	VOLUME	733562.830	4072028.050	0.0
LOCATION	BASS27	VOLUME	733576.030	4072030.900	0.0
LOCATION	BASS28	VOLUME	733589.220	4072033.780	0.0
LOCATION	BASS29	VOLUME	733602.400	4072036.670	0.0
LOCATION	BASS30	VOLUME	733615.590	4072039.570	0.0
LOCATION	BASS31	VOLUME	733628.780	4072042.460	0.0
LOCATION	BASS32	VOLUME	733641.960	4072045.360	0.0
LOCATION	BASS33	VOLUME	733655.150	4072048.250	0.0
LOCATION	BASS34	VOLUME	733668.330	4072051.150	0.0
LOCATION	BASS35	VOLUME	733681.520	4072054.040	0.0
LOCATION	BASS36	VOLUME	733693.310	4072060.360	0.0
LOCATION	BASS37	VOLUME	733704.740	4072067.530	0.0
LOCATION	BASS38	VOLUME	733716.180	4072074.700	0.0
LOCATION	BASS39	VOLUME	733727.620	4072081.870	0.0
LOCATION	BASS40	VOLUME	733739.060	4072089.040	0.0
LOCATION	BASS41	VOLUME	733750.500	4072096.210	0.0
LOCATION	BASS42	VOLUME	733761.940	4072103.380	0.0
LOCATION	BASS43	VOLUME	733772.580	4072111.460	0.0
LOCATION	BASS44	VOLUME	733781.230	4072121.830	0.0
LOCATION	BASS45	VOLUME	733789.880	4072132.190	0.0
LOCATION	BASS46	VOLUME	733798.530	4072142.560	0.0
LOCATION	BASS47	VOLUME	733807.180	4072152.920	0.0
LOCATION	BASS48	VOLUME	733815.830	4072163.280	0.0
LOCATION	BASS49	VOLUME	733824.480	4072173.650	0.0
LOCATION	BASS50	VOLUME	733833.130	4072184.010	0.0
LOCATION	BASS51	VOLUME	733841.790	4072194.380	0.0
LOCATION	BASS52	VOLUME	733850.440	4072204.740	0.0
LOCATION	BASS53	VOLUME	733857.870	4072215.910	0.0
LOCATION	BASS54	VOLUME	733864.070	4072227.910	0.0
LOCATION	BASS55	VOLUME	733870.260	4072239.900	0.0
LOCATION	BASS56	VOLUME	733876.460	4072251.890	0.0
LOCATION	BASS57	VOLUME	733882.660	4072263.890	0.0
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LOCATION	BASS61	VOLUME	733907.440	4072311.860	0.0
LOCATION	BASS62	VOLUME	733913.640	4072323.860	0.0
LOCATION	BASS63	VOLUME	733919.830	4072335.850	0.0
LOCATION	BASS64	VOLUME	733926.030	4072347.850	0.0
LOCATION	BASS65	VOLUME	733932.230	4072359.840	0.0
LOCATION	BASS66	VOLUME	733938.420	4072371.830	0.0
LOCATION	BASS67	VOLUME	733944.620	4072383.830	0.0
LOCATION	BASS68	VOLUME	733950.820	4072395.820	0.0
LOCATION	BASS69	VOLUME	733957.010	4072407.810	0.0
LOCATION	BASS70	VOLUME	733963.210	4072419.810	0.0
LOCATION	BASS71	VOLUME	733969.410	4072431.800	0.0

LOCATION	BASS72	VOLUME	733975.600	4072443.800	0.0
LOCATION	BASS73	VOLUME	733981.800	4072455.790	0.0
LOCATION	BASS74	VOLUME	733988.000	4072467.780	0.0
LOCATION	BASS75	VOLUME	733994.190	4072479.780	0.0
LOCATION	BASS76	VOLUME	734000.390	4072491.770	0.0
LOCATION	BASS77	VOLUME	734006.590	4072503.770	0.0
LOCATION	BASS78	VOLUME	734012.780	4072515.760	0.0
LOCATION	BASS79	VOLUME	734018.980	4072527.750	0.0
LOCATION	BASS80	VOLUME	734025.180	4072539.750	0.0
LOCATION	BASS81	VOLUME	734031.370	4072551.740	0.0
LOCATION	BASS82	VOLUME	734037.570	4072563.730	0.0
LOCATION	BASS83	VOLUME	734043.770	4072575.730	0.0
LOCATION	BASS84	VOLUME	734049.960	4072587.720	0.0
LOCATION	BASS85	VOLUME	734056.160	4072599.720	0.0
LOCATION	BASS86	VOLUME	734062.360	4072611.710	0.0
LOCATION	BASS87	VOLUME	734068.550	4072623.700	0.0
LOCATION	BASS88	VOLUME	734074.750	4072635.700	0.0
LOCATION	BASS89	VOLUME	734080.940	4072647.690	0.0
LOCATION	BASS90	VOLUME	734087.140	4072659.690	0.0
LOCATION	BASS91	VOLUME	734093.340	4072671.680	0.0
LOCATION	BASS92	VOLUME	734099.530	4072683.670	0.0
LOCATION	BASS93	VOLUME	734105.730	4072695.670	0.0
LOCATION	BASS94	VOLUME	734111.930	4072707.660	0.0
LOCATION	BASS95	VOLUME	734118.120	4072719.660	0.0
LOCATION	BASS96	VOLUME	734124.320	4072731.650	0.0
LOCATION	BASS97	VOLUME	734130.520	4072743.640	0.0
LOCATION	BASS98	VOLUME	734136.710	4072755.640	0.0
LOCATION	BASS99	VOLUME	734142.910	4072767.630	0.0
LOCATION	BASS100	VOLUME	734149.110	4072779.620	0.0
LOCATION	BASS101	VOLUME	734155.300	4072791.620	0.0
LOCATION	BASS102	VOLUME	734161.500	4072803.610	0.0
LOCATION	BASS103	VOLUME	734167.700	4072815.610	0.0
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LOCATION HIGHWAY40    VOLUME     739251.650  4068763.000          0.0
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LOCATION	HIGHWAY199	VOLUME	737124.500	4068515.650	0.0
LOCATION	HIGHWAY200	VOLUME	737111.110	4068513.980	0.0
LOCATION	HIGHWAY201	VOLUME	737097.710	4068512.320	0.0
LOCATION	HIGHWAY202	VOLUME	737084.310	4068510.660	0.0

LOCATION	HIGHWAY203	VOLUME	737070.910	4068508.990	0.0
LOCATION	HIGHWAY204	VOLUME	737057.520	4068507.330	0.0
LOCATION	HIGHWAY205	VOLUME	737044.120	4068505.670	0.0
LOCATION	HIGHWAY206	VOLUME	737030.720	4068504.010	0.0
LOCATION	HIGHWAY207	VOLUME	737017.330	4068502.340	0.0
LOCATION	HIGHWAY208	VOLUME	737003.930	4068500.680	0.0
LOCATION	HIGHWAY209	VOLUME	736990.530	4068499.020	0.0
LOCATION	HIGHWAY210	VOLUME	736977.130	4068497.350	0.0
LOCATION	HIGHWAY211	VOLUME	736963.740	4068495.690	0.0
LOCATION	HIGHWAY212	VOLUME	736950.340	4068494.030	0.0
LOCATION	HIGHWAY213	VOLUME	736936.940	4068492.360	0.0
LOCATION	HIGHWAY214	VOLUME	736923.550	4068490.700	0.0
LOCATION	HIGHWAY215	VOLUME	736910.150	4068489.040	0.0
LOCATION	HIGHWAY216	VOLUME	736896.750	4068487.370	0.0
LOCATION	HIGHWAY217	VOLUME	736883.350	4068485.710	0.0
LOCATION	HIGHWAY218	VOLUME	736869.980	4068483.870	0.0
LOCATION	HIGHWAY219	VOLUME	736856.660	4068481.680	0.0
LOCATION	HIGHWAY220	VOLUME	736843.340	4068479.490	0.0
LOCATION	HIGHWAY221	VOLUME	736830.020	4068477.300	0.0
LOCATION	HIGHWAY222	VOLUME	736816.700	4068475.110	0.0
LOCATION	HIGHWAY223	VOLUME	736803.380	4068472.920	0.0
LOCATION	HIGHWAY224	VOLUME	736790.060	4068470.730	0.0
LOCATION	HIGHWAY225	VOLUME	736776.730	4068468.540	0.0
LOCATION	HIGHWAY226	VOLUME	736763.410	4068466.350	0.0
LOCATION	HIGHWAY227	VOLUME	736750.090	4068464.160	0.0
LOCATION	HIGHWAY228	VOLUME	736736.770	4068461.970	0.0
LOCATION	HIGHWAY229	VOLUME	736723.450	4068459.780	0.0
LOCATION	HIGHWAY230	VOLUME	736710.130	4068457.590	0.0
LOCATION	HIGHWAY231	VOLUME	736696.810	4068455.400	0.0
LOCATION	HIGHWAY232	VOLUME	736683.490	4068453.220	0.0
LOCATION	HIGHWAY233	VOLUME	736670.160	4068451.030	0.0
LOCATION	HIGHWAY234	VOLUME	736656.840	4068448.840	0.0
LOCATION	HIGHWAY235	VOLUME	736643.520	4068446.650	0.0
LOCATION	HIGHWAY236	VOLUME	736630.200	4068444.460	0.0
LOCATION	HIGHWAY237	VOLUME	736616.880	4068442.270	0.0
LOCATION	HIGHWAY238	VOLUME	736603.560	4068440.080	0.0
LOCATION	HIGHWAY239	VOLUME	736590.240	4068437.890	0.0
LOCATION	HIGHWAY240	VOLUME	736576.910	4068435.700	0.0
LOCATION	HIGHWAY241	VOLUME	736563.590	4068433.510	0.0
LOCATION	HIGHWAY242	VOLUME	736550.270	4068431.320	0.0
LOCATION	HIGHWAY243	VOLUME	736536.950	4068429.130	0.0
LOCATION	HIGHWAY244	VOLUME	736523.630	4068426.940	0.0
LOCATION	HIGHWAY245	VOLUME	736510.310	4068424.750	0.0
LOCATION	HIGHWAY246	VOLUME	736496.990	4068422.560	0.0
LOCATION	HIGHWAY247	VOLUME	736483.670	4068420.380	0.0
LOCATION	HIGHWAY248	VOLUME	736470.340	4068418.190	0.0
LOCATION	HIGHWAY249	VOLUME	736457.020	4068416.000	0.0
LOCATION	HIGHWAY250	VOLUME	736443.700	4068413.810	0.0
LOCATION	HIGHWAY251	VOLUME	736430.380	4068411.620	0.0
LOCATION	HIGHWAY252	VOLUME	736417.060	4068409.430	0.0
LOCATION	HIGHWAY253	VOLUME	736403.740	4068407.240	0.0
LOCATION	HIGHWAY254	VOLUME	736390.420	4068405.050	0.0
LOCATION	HIGHWAY255	VOLUME	736377.100	4068402.860	0.0
LOCATION	HIGHWAY256	VOLUME	736363.770	4068400.670	0.0

LOCATION HIGHWAY257 VOLUME 736350.450 4068398.480 0.0
LOCATION HIGHWAY258 VOLUME 736337.130 4068396.290 0.0
LOCATION HIGHWAY259 VOLUME 736323.800 4068394.180 0.0
LOCATION HIGHWAY260 VOLUME 736310.440 4068392.200 0.0
LOCATION HIGHWAY261 VOLUME 736297.090 4068390.220 0.0
LOCATION HIGHWAY262 VOLUME 736283.740 4068388.230 0.0
LOCATION HIGHWAY263 VOLUME 736270.380 4068386.250 0.0
LOCATION HIGHWAY264 VOLUME 736257.030 4068384.270 0.0
LOCATION HIGHWAY265 VOLUME 736243.680 4068382.280 0.0
LOCATION HIGHWAY266 VOLUME 736230.320 4068380.300 0.0
LOCATION HIGHWAY267 VOLUME 736216.970 4068378.320 0.0
LOCATION HIGHWAY268 VOLUME 736203.620 4068376.340 0.0
LOCATION HIGHWAY269 VOLUME 736190.260 4068374.350 0.0
LOCATION HIGHWAY270 VOLUME 736176.910 4068372.370 0.0
LOCATION HIGHWAY271 VOLUME 736163.560 4068370.390 0.0
LOCATION HIGHWAY272 VOLUME 736150.200 4068368.400 0.0
LOCATION HIGHWAY273 VOLUME 736136.850 4068366.420 0.0
LOCATION HIGHWAY274 VOLUME 736123.490 4068364.440 0.0
LOCATION HIGHWAY275 VOLUME 736110.140 4068362.450 0.0
LOCATION HIGHWAY276 VOLUME 736096.790 4068360.470 0.0
LOCATION HIGHWAY277 VOLUME 736083.430 4068358.490 0.0
LOCATION HIGHWAY278 VOLUME 736070.080 4068356.510 0.0
LOCATION HIGHWAY279 VOLUME 736056.730 4068354.520 0.0
LOCATION HIGHWAY280 VOLUME 736043.370 4068352.540 0.0
LOCATION HIGHWAY281 VOLUME 736030.020 4068350.560 0.0
LOCATION HIGHWAY282 VOLUME 736016.670 4068348.570 0.0
LOCATION HIGHWAY283 VOLUME 736003.300 4068346.690 0.0
LOCATION HIGHWAY284 VOLUME 735989.830 4068345.800 0.0
LOCATION HIGHWAY285 VOLUME 735976.360 4068344.910 0.0
LOCATION HIGHWAY286 VOLUME 735962.890 4068344.020 0.0
LOCATION HIGHWAY287 VOLUME 735949.420 4068343.130 0.0
LOCATION HIGHWAY288 VOLUME 735935.950 4068342.240 0.0
LOCATION HIGHWAY289 VOLUME 735922.480 4068341.350 0.0
LOCATION HIGHWAY290 VOLUME 735909.010 4068340.460 0.0
LOCATION HIGHWAY291 VOLUME 735895.540 4068339.570 0.0
LOCATION HIGHWAY292 VOLUME 735882.070 4068338.670 0.0
LOCATION HIGHWAY293 VOLUME 735868.600 4068337.780 0.0
LOCATION HIGHWAY294 VOLUME 735855.130 4068336.890 0.0
LOCATION HIGHWAY295 VOLUME 735841.650 4068336.000 0.0
LOCATION HIGHWAY296 VOLUME 735828.180 4068335.110 0.0
LOCATION HIGHWAY297 VOLUME 735814.710 4068334.220 0.0
LOCATION HIGHWAY298 VOLUME 735801.730 4068335.890 0.0
LOCATION HIGHWAY299 VOLUME 735789.550 4068341.710 0.0
LOCATION HIGHWAY300 VOLUME 735777.370 4068347.530 0.0
LOCATION HIGHWAY301 VOLUME 735765.190 4068353.350 0.0
LOCATION HIGHWAY302 VOLUME 735753.010 4068359.170 0.0
LOCATION HIGHWAY303 VOLUME 735740.830 4068364.990 0.0
LOCATION HIGHWAY304 VOLUME 735728.650 4068370.800 0.0
LOCATION HIGHWAY305 VOLUME 735716.470 4068376.620 0.0
LOCATION HIGHWAY306 VOLUME 735704.290 4068382.440 0.0
LOCATION HIGHWAY307 VOLUME 735692.100 4068388.260 0.0
LOCATION HIGHWAY308 VOLUME 735679.920 4068394.080 0.0
LOCATION HIGHWAY309 VOLUME 735667.740 4068399.900 0.0
LOCATION HIGHWAY310 VOLUME 735655.560 4068405.720 0.0

LOCATION	HIGHWAY311	VOLUME	735643.380	4068411.540	0.0
LOCATION	HIGHWAY312	VOLUME	735631.200	4068417.360	0.0
LOCATION	HIGHWAY313	VOLUME	735619.020	4068423.180	0.0
LOCATION	HIGHWAY314	VOLUME	735608.120	4068430.300	0.0
LOCATION	HIGHWAY315	VOLUME	735602.140	4068442.410	0.0
LOCATION	HIGHWAY316	VOLUME	735596.170	4068454.510	0.0
LOCATION	HIGHWAY317	VOLUME	735590.190	4068466.620	0.0
LOCATION	HIGHWAY318	VOLUME	735584.220	4068478.720	0.0
LOCATION	HIGHWAY319	VOLUME	735578.240	4068490.830	0.0
LOCATION	HIGHWAY320	VOLUME	735572.270	4068502.930	0.0
LOCATION	HIGHWAY321	VOLUME	735566.290	4068515.040	0.0
LOCATION	HIGHWAY322	VOLUME	735560.320	4068527.150	0.0
LOCATION	HIGHWAY323	VOLUME	735555.420	4068539.710	0.0
LOCATION	HIGHWAY324	VOLUME	735550.820	4068552.400	0.0
LOCATION	HIGHWAY325	VOLUME	735546.220	4068565.100	0.0
LOCATION	HIGHWAY326	VOLUME	735541.620	4068577.790	0.0
LOCATION	HIGHWAY327	VOLUME	735537.020	4068590.480	0.0
LOCATION	HIGHWAY328	VOLUME	735532.410	4068603.170	0.0
LOCATION	HIGHWAY329	VOLUME	735527.770	4068615.850	0.0
LOCATION	HIGHWAY330	VOLUME	735523.010	4068628.480	0.0
LOCATION	HIGHWAY331	VOLUME	735518.240	4068641.110	0.0
LOCATION	HIGHWAY332	VOLUME	735513.480	4068653.740	0.0
LOCATION	HIGHWAY333	VOLUME	735508.720	4068666.370	0.0
LOCATION	HIGHWAY334	VOLUME	735503.960	4068679.010	0.0
LOCATION	HIGHWAY335	VOLUME	735499.190	4068691.640	0.0
LOCATION	HIGHWAY336	VOLUME	735494.430	4068704.270	0.0
LOCATION	HIGHWAY337	VOLUME	735489.670	4068716.900	0.0
LOCATION	HIGHWAY338	VOLUME	735484.910	4068729.530	0.0
LOCATION	HIGHWAY339	VOLUME	735480.140	4068742.170	0.0
LOCATION	HIGHWAY340	VOLUME	735475.380	4068754.800	0.0
LOCATION	HIGHWAY341	VOLUME	735470.620	4068767.430	0.0
LOCATION	HIGHWAY342	VOLUME	735465.860	4068780.060	0.0
LOCATION	HIGHWAY343	VOLUME	735461.090	4068792.690	0.0
LOCATION	HIGHWAY344	VOLUME	735456.330	4068805.330	0.0
LOCATION	HIGHWAY345	VOLUME	735451.570	4068817.960	0.0
LOCATION	HIGHWAY346	VOLUME	735446.810	4068830.590	0.0
LOCATION	HIGHWAY347	VOLUME	735442.040	4068843.220	0.0
LOCATION	HIGHWAY348	VOLUME	735437.280	4068855.850	0.0
LOCATION	HIGHWAY349	VOLUME	735432.520	4068868.490	0.0
LOCATION	HIGHWAY350	VOLUME	735427.760	4068881.120	0.0
LOCATION	HIGHWAY351	VOLUME	735422.990	4068893.750	0.0
LOCATION	HIGHWAY352	VOLUME	735418.230	4068906.380	0.0
LOCATION	HIGHWAY353	VOLUME	735413.470	4068919.010	0.0
LOCATION	HIGHWAY354	VOLUME	735408.710	4068931.650	0.0
LOCATION	HIGHWAY355	VOLUME	735403.940	4068944.280	0.0
LOCATION	HIGHWAY356	VOLUME	735399.180	4068956.910	0.0
LOCATION	HIGHWAY357	VOLUME	735394.420	4068969.540	0.0
LOCATION	HIGHWAY358	VOLUME	735389.660	4068982.170	0.0
LOCATION	HIGHWAY359	VOLUME	735384.890	4068994.810	0.0
LOCATION	HIGHWAY360	VOLUME	735380.130	4069007.440	0.0
LOCATION	HIGHWAY361	VOLUME	735375.370	4069020.070	0.0
LOCATION	HIGHWAY362	VOLUME	735370.610	4069032.700	0.0
LOCATION	HIGHWAY363	VOLUME	735365.840	4069045.330	0.0
LOCATION	HIGHWAY364	VOLUME	735361.080	4069057.970	0.0

LOCATION	HIGHWAY365	VOLUME	735356.320	4069070.600	0.0
LOCATION	HIGHWAY366	VOLUME	735351.550	4069083.230	0.0
LOCATION	HIGHWAY367	VOLUME	735346.790	4069095.860	0.0
LOCATION	HIGHWAY368	VOLUME	735342.030	4069108.490	0.0
LOCATION	HIGHWAY369	VOLUME	735337.270	4069121.130	0.0
LOCATION	HIGHWAY370	VOLUME	735332.500	4069133.760	0.0
LOCATION	HIGHWAY371	VOLUME	735327.740	4069146.390	0.0
LOCATION	HIGHWAY372	VOLUME	735322.980	4069159.020	0.0
LOCATION	HIGHWAY373	VOLUME	735318.230	4069171.660	0.0
LOCATION	HIGHWAY374	VOLUME	735313.510	4069184.310	0.0
LOCATION	HIGHWAY375	VOLUME	735308.780	4069196.950	0.0
LOCATION	HIGHWAY376	VOLUME	735304.050	4069209.600	0.0
LOCATION	HIGHWAY377	VOLUME	735299.330	4069222.240	0.0
LOCATION	HIGHWAY378	VOLUME	735294.600	4069234.890	0.0
LOCATION	HIGHWAY379	VOLUME	735289.880	4069247.540	0.0
LOCATION	HIGHWAY380	VOLUME	735285.150	4069260.180	0.0
LOCATION	HIGHWAY381	VOLUME	735280.420	4069272.830	0.0
LOCATION	HIGHWAY382	VOLUME	735275.700	4069285.470	0.0
LOCATION	HIGHWAY383	VOLUME	735270.970	4069298.120	0.0
LOCATION	HIGHWAY384	VOLUME	735266.250	4069310.760	0.0
LOCATION	HIGHWAY385	VOLUME	735261.520	4069323.410	0.0
LOCATION	HIGHWAY386	VOLUME	735256.800	4069336.060	0.0
LOCATION	HIGHWAY387	VOLUME	735252.070	4069348.700	0.0
LOCATION	HIGHWAY388	VOLUME	735247.340	4069361.350	0.0
LOCATION	HIGHWAY389	VOLUME	735242.620	4069373.990	0.0
LOCATION	HIGHWAY390	VOLUME	735237.890	4069386.640	0.0
LOCATION	HIGHWAY391	VOLUME	735233.170	4069399.280	0.0
LOCATION	HIGHWAY392	VOLUME	735228.440	4069411.930	0.0
LOCATION	HIGHWAY393	VOLUME	735223.720	4069424.580	0.0
LOCATION	HIGHWAY394	VOLUME	735218.990	4069437.220	0.0
LOCATION	HIGHWAY395	VOLUME	735214.260	4069449.870	0.0
LOCATION	HIGHWAY396	VOLUME	735209.540	4069462.510	0.0
LOCATION	HIGHWAY397	VOLUME	735204.810	4069475.160	0.0
LOCATION	HIGHWAY398	VOLUME	735200.090	4069487.810	0.0
LOCATION	HIGHWAY399	VOLUME	735195.360	4069500.450	0.0
LOCATION	HIGHWAY400	VOLUME	735190.630	4069513.100	0.0
LOCATION	HIGHWAY401	VOLUME	735185.910	4069525.740	0.0
LOCATION	HIGHWAY402	VOLUME	735181.180	4069538.390	0.0
LOCATION	HIGHWAY403	VOLUME	735176.460	4069551.030	0.0
LOCATION	HIGHWAY404	VOLUME	735171.730	4069563.680	0.0
LOCATION	HIGHWAY405	VOLUME	735167.010	4069576.330	0.0
LOCATION	HIGHWAY406	VOLUME	735162.280	4069588.970	0.0
LOCATION	HIGHWAY407	VOLUME	735157.550	4069601.620	0.0
LOCATION	HIGHWAY408	VOLUME	735152.830	4069614.260	0.0
LOCATION	HIGHWAY409	VOLUME	735148.100	4069626.910	0.0
LOCATION	HIGHWAY410	VOLUME	735143.380	4069639.560	0.0
LOCATION	HIGHWAY411	VOLUME	735136.520	4069650.840	0.0
LOCATION	HIGHWAY412	VOLUME	735127.010	4069660.420	0.0
LOCATION	HIGHWAY413	VOLUME	735117.510	4069670.010	0.0
LOCATION	HIGHWAY414	VOLUME	735108.000	4069679.590	0.0
LOCATION	HIGHWAY415	VOLUME	735098.490	4069689.180	0.0
LOCATION	HIGHWAY416	VOLUME	735088.990	4069698.770	0.0
LOCATION	HIGHWAY417	VOLUME	735079.480	4069708.350	0.0
LOCATION	HIGHWAY418	VOLUME	735069.980	4069717.940	0.0

LOCATION	HIGHWAY419	VOLUME	735060.470	4069727.520	0.0
LOCATION	HIGHWAY420	VOLUME	735050.970	4069737.110	0.0
LOCATION	HIGHWAY421	VOLUME	735041.460	4069746.700	0.0
LOCATION	HIGHWAY422	VOLUME	735031.950	4069756.280	0.0
LOCATION	HIGHWAY423	VOLUME	735022.450	4069765.870	0.0
LOCATION	HIGHWAY424	VOLUME	735012.940	4069775.450	0.0
LOCATION	HIGHWAY425	VOLUME	735003.440	4069785.040	0.0
LOCATION	HIGHWAY426	VOLUME	734993.930	4069794.630	0.0
LOCATION	HIGHWAY427	VOLUME	734984.430	4069804.210	0.0
LOCATION	HIGHWAY428	VOLUME	734974.920	4069813.800	0.0
LOCATION	HIGHWAY429	VOLUME	734965.410	4069823.380	0.0
LOCATION	HIGHWAY430	VOLUME	734955.910	4069832.970	0.0
LOCATION	HIGHWAY431	VOLUME	734946.400	4069842.560	0.0
LOCATION	HIGHWAY432	VOLUME	734936.900	4069852.140	0.0
LOCATION	HIGHWAY433	VOLUME	734927.390	4069861.730	0.0
LOCATION	HIGHWAY434	VOLUME	734917.890	4069871.310	0.0
LOCATION	HIGHWAY435	VOLUME	734908.380	4069880.900	0.0
LOCATION	HIGHWAY436	VOLUME	734898.880	4069890.490	0.0
LOCATION	HIGHWAY437	VOLUME	734889.370	4069900.070	0.0
LOCATION	HIGHWAY438	VOLUME	734879.860	4069909.660	0.0
LOCATION	HIGHWAY439	VOLUME	734870.360	4069919.240	0.0
LOCATION	HIGHWAY440	VOLUME	734860.850	4069928.830	0.0
LOCATION	HIGHWAY441	VOLUME	734851.350	4069938.420	0.0
LOCATION	HIGHWAY442	VOLUME	734841.840	4069948.000	0.0
LOCATION	HIGHWAY443	VOLUME	734832.340	4069957.590	0.0
LOCATION	HIGHWAY444	VOLUME	734822.830	4069967.170	0.0
LOCATION	HIGHWAY445	VOLUME	734813.320	4069976.760	0.0
LOCATION	HIGHWAY446	VOLUME	734803.820	4069986.350	0.0
LOCATION	HIGHWAY447	VOLUME	734794.310	4069995.930	0.0
LOCATION	HIGHWAY448	VOLUME	734784.810	4070005.520	0.0
LOCATION	HIGHWAY449	VOLUME	734775.300	4070015.100	0.0
LOCATION	HIGHWAY450	VOLUME	734765.800	4070024.690	0.0
LOCATION	HIGHWAY451	VOLUME	734756.290	4070034.280	0.0
LOCATION	HIGHWAY452	VOLUME	734746.780	4070043.860	0.0
LOCATION	HIGHWAY453	VOLUME	734737.280	4070053.450	0.0
LOCATION	HIGHWAY454	VOLUME	734727.770	4070063.030	0.0
LOCATION	HIGHWAY455	VOLUME	734718.270	4070072.620	0.0
LOCATION	HIGHWAY456	VOLUME	734708.760	4070082.210	0.0
LOCATION	HIGHWAY457	VOLUME	734699.260	4070091.790	0.0
LOCATION	HIGHWAY458	VOLUME	734689.750	4070101.380	0.0
LOCATION	HIGHWAY459	VOLUME	734680.210	4070110.930	0.0
LOCATION	HIGHWAY460	VOLUME	734670.620	4070120.430	0.0
LOCATION	HIGHWAY461	VOLUME	734661.020	4070129.920	0.0
LOCATION	HIGHWAY462	VOLUME	734651.430	4070139.420	0.0
LOCATION	HIGHWAY463	VOLUME	734641.830	4070148.920	0.0
LOCATION	HIGHWAY464	VOLUME	734632.240	4070158.420	0.0
LOCATION	HIGHWAY465	VOLUME	734622.640	4070167.910	0.0
LOCATION	HIGHWAY466	VOLUME	734613.050	4070177.410	0.0
LOCATION	HIGHWAY467	VOLUME	734603.460	4070186.910	0.0
LOCATION	HIGHWAY468	VOLUME	734593.860	4070196.410	0.0
LOCATION	HIGHWAY469	VOLUME	734584.270	4070205.900	0.0
LOCATION	HIGHWAY470	VOLUME	734574.670	4070215.400	0.0
LOCATION	HIGHWAY471	VOLUME	734565.080	4070224.900	0.0
LOCATION	HIGHWAY472	VOLUME	734555.480	4070234.400	0.0

LOCATION	HIGHWAY473	VOLUME	734545.890	4070243.890	0.0
LOCATION	HIGHWAY474	VOLUME	734536.300	4070253.390	0.0
LOCATION	HIGHWAY475	VOLUME	734526.700	4070262.890	0.0
LOCATION	HIGHWAY476	VOLUME	734517.110	4070272.390	0.0
LOCATION	HIGHWAY477	VOLUME	734507.510	4070281.880	0.0
LOCATION	HIGHWAY478	VOLUME	734497.920	4070291.380	0.0
LOCATION	HIGHWAY479	VOLUME	734488.320	4070300.880	0.0
LOCATION	HIGHWAY480	VOLUME	734478.730	4070310.380	0.0
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LOCATION	HIGHWAY486	VOLUME	734421.160	4070367.360	0.0
LOCATION	HIGHWAY487	VOLUME	734411.570	4070376.860	0.0
LOCATION	HIGHWAY488	VOLUME	734401.980	4070386.350	0.0
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LOCATION	HIGHWAY490	VOLUME	734382.790	4070405.350	0.0
LOCATION	HIGHWAY491	VOLUME	734373.190	4070414.850	0.0
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LOCATION	HIGHWAY493	VOLUME	734354.000	4070433.840	0.0
LOCATION	HIGHWAY494	VOLUME	734344.410	4070443.340	0.0
LOCATION	HIGHWAY495	VOLUME	734334.820	4070452.840	0.0
LOCATION	HIGHWAY496	VOLUME	734325.220	4070462.330	0.0
LOCATION	HIGHWAY497	VOLUME	734315.630	4070471.830	0.0
LOCATION	HIGHWAY498	VOLUME	734306.030	4070481.330	0.0
LOCATION	HIGHWAY499	VOLUME	734296.440	4070490.830	0.0
LOCATION	HIGHWAY500	VOLUME	734286.840	4070500.320	0.0
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LOCATION	HIGHWAY508	VOLUME	734210.090	4070576.300	0.0
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SRCPARAM S0000153     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000154     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000155     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000156     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000157     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000158     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000159     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000160     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000161     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000162     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000163     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000164     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000165     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000166     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000167     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000168     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000169     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000170     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000171     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000172     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000173     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000174     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000175     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000176     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000177     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000178     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000179     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000180     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000181     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000182     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000183     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000184     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000185     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000186     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000187     0.0042553191      2.88      6.28      2.37
SRCPARAM S0000188     0.0042553191      2.88      6.28      2.37
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   SRCPARAM S0000189     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000190     0.0042553191      2.88      6.28      2.37
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   SRCPARAM S0000192     0.0042553191      2.88      6.28      2.37
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   SRCPARAM S0000194     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000195     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000196     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000197     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000198     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000199     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000200     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000201     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000202     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000203     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000204     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000205     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000206     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000207     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000208     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000209     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000210     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000211     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000212     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000213     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000214     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000215     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000216     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000217     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000218     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000219     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000220     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000221     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000222     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000223     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000224     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000225     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000226     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000227     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000228     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000229     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000230     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000231     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000232     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000233     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000234     0.0042553191      2.88      6.28      2.37
   SRCPARAM S0000235     0.0042553191      2.88      6.28      2.37
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** LINE VOLUME Source ID = SLINE1
   SRCPARAM L0000236     0.0086206897      2.55      6.28      2.37
   SRCPARAM L0000237     0.0086206897      2.55      6.28      2.37
   SRCPARAM L0000238     0.0086206897      2.55      6.28      2.37
   SRCPARAM L0000239     0.0086206897      2.55      6.28      2.37
   SRCPARAM L0000240     0.0086206897      2.55      6.28      2.37
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SRCPARAM L0000241     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000242     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000243     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000244     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000245     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000246     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000247     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000248     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000249     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000250     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000251     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000252     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000253     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000254     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000255     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000256     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000257     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000258     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000259     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000260     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000261     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000262     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000263     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000264     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000265     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000266     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000267     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000268     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000269     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000270     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000271     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000272     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000273     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000274     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000275     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000276     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000277     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000278     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000279     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000280     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000281     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000282     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000283     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000284     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000285     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000286     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000287     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000288     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000289     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000290     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000291     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000292     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000293     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000294     0.0086206897      2.55      6.28      2.37
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SRCPARAM L0000295     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000296     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000297     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000298     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000299     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000300     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000301     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000302     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000303     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000304     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000305     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000306     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000307     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000308     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000309     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000310     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000311     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000312     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000313     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000314     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000315     0.0086206897      2.55      6.28      2.37
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SRCPARAM L0000318     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000319     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000320     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000321     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000322     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000323     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000324     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000325     0.0086206897      2.55      6.28      2.37
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SRCPARAM L0000327     0.0086206897      2.55      6.28      2.37
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SRCPARAM L0000330     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000331     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000332     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000333     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000334     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000335     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000336     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000337     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000338     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000339     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000340     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000341     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000342     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000343     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000344     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000345     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000346     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000347     0.0086206897      2.55      6.28      2.37
SRCPARAM L0000348     0.0086206897      2.55      6.28      2.37
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   SRCPARAM L0000349     0.0086206897      2.55      6.28      2.37
   SRCPARAM L0000350     0.0086206897      2.55      6.28      2.37
   SRCPARAM L0000351     0.0086206897      2.55      6.28      2.37
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** LINE VOLUME Source ID = OVERLAP
   SRCPARAM OVER0384       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0385       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0386       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0387       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0388       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0389       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0390       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0391       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0392       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0393       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0394       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0395       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0396       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0397       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0398       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0399       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0400       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0401       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0402       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0403       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0404       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0405       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0406       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0407       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0408       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0409       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0410       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0411       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0412       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0413       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0414       0.03125      2.55      6.28      2.37
   SRCPARAM OVER0415       0.03125      2.55      6.28      2.37
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   SRCPARAM BASS01       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS02       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS03       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS04       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS05       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS06       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS07       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS08       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS09       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS10       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS11       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS12       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS13       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS14       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS15       0.006896552     2.550     6.280     2.370
   SRCPARAM BASS16       0.006896552     2.550     6.280     2.370
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SRCPARAM BASS17       0.006896552     2.550     6.280     2.370
SRCPARAM BASS18       0.006896552     2.550     6.280     2.370
SRCPARAM BASS19       0.006896552     2.550     6.280     2.370
SRCPARAM BASS20       0.006896552     2.550     6.280     2.370
SRCPARAM BASS21       0.006896552     2.550     6.280     2.370
SRCPARAM BASS22       0.006896552     2.550     6.280     2.370
SRCPARAM BASS23       0.006896552     2.550     6.280     2.370
SRCPARAM BASS24       0.006896552     2.550     6.280     2.370
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SRCPARAM BASS27       0.006896552     2.550     6.280     2.370
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SRCPARAM BASS29       0.006896552     2.550     6.280     2.370
SRCPARAM BASS30       0.006896552     2.550     6.280     2.370
SRCPARAM BASS31       0.006896552     2.550     6.280     2.370
SRCPARAM BASS32       0.006896552     2.550     6.280     2.370
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SRCPARAM BASS38       0.006896552     2.550     6.280     2.370
SRCPARAM BASS39       0.006896552     2.550     6.280     2.370
SRCPARAM BASS40       0.006896552     2.550     6.280     2.370
SRCPARAM BASS41       0.006896552     2.550     6.280     2.370
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SRCPARAM BASS43       0.006896552     2.550     6.280     2.370
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SRCPARAM BASS45       0.006896552     2.550     6.280     2.370
SRCPARAM BASS46       0.006896552     2.550     6.280     2.370
SRCPARAM BASS47       0.006896552     2.550     6.280     2.370
SRCPARAM BASS48       0.006896552     2.550     6.280     2.370
SRCPARAM BASS49       0.006896552     2.550     6.280     2.370
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SRCPARAM HIGHWAY417   0.001650165     2.550     6.280     2.370
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BASS16
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BASS24
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BASS32
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BASS56
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** AERMOD Receptor Pathway
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		FLAG	6	1.80	1.80	1.80	1.80	1.80	1.80
		FLAG	6	1.80	1.80				
		FLAG	7	1.80	1.80	1.80	1.80	1.80	1.80
		FLAG	7	1.80	1.80	1.80	1.80	1.80	1.80
		FLAG	7	1.80	1.80	1.80	1.80	1.80	1.80
		FLAG	7	1.80	1.80	1.80	1.80	1.80	1.80
		FLAG	7	1.80	1.80	1.80	1.80	1.80	1.80
		FLAG	7	1.80	1.80	1.80	1.80	1.80	1.80
		FLAG	7	1.80	1.80	1.80	1.80	1.80	1.80
		FLAG	7	1.80	1.80	1.80	1.80	1.80	1.80
		FLAG	7	1.80	1.80	1.80	1.80	1.80	1.80
		FLAG	7	1.80	1.80	1.80	1.80	1.80	1.80
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		FLAG	7	1.80	1.80	1.80	1.80	1.80	1.80
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   GRIDCART UCART1 END
** DESCRREC "" ""
   DISCCART    733694.00   4071080.00    0.00
   DISCCART    733752.00   4071015.00    0.00
   DISCCART    733538.00   4070955.00    0.00
   DISCCART    733603.00   4070867.00    0.00
   DISCCART    734294.00   4070090.00    0.00
   DISCCART    734235.00   4071367.00    0.00
   DISCCART    733005.00   4070881.00    0.00
   DISCCART    732939.00   4070783.00    0.00
   DISCCART    733270.00   4071359.00    0.00
   DISCCART    733256.00   4071101.00    0.00
   DISCCART    736165.00   4076646.00    0.00
   DISCCART    736142.00   4076652.00    0.00
   DISCCART    736119.00   4076657.00    0.00
   DISCCART    736101.00   4076662.00    0.00
   DISCCART    736268.00   4076567.00    0.00
   DISCCART    733522.00   4075870.00    0.00
   DISCCART    733503.00   4075810.00    0.00
   DISCCART    733490.00   4075730.00    0.00
   DISCCART    733478.00   4075697.00    0.00
   DISCCART    734427.00   4075111.00    0.00
   DISCCART    743494.00   4075470.00    0.00
   DISCCART    733964.00   4075622.00    0.00
   DISCCART    734243.00   4072940.00    0.00
   DISCCART    734224.00   4072962.00    0.00
   DISCCART    734188.00   4072900.00    0.00
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   DISCCART    743177.00   4072824.00    0.00
   DISCCART    734718.00   4073308.00    0.00
   DISCCART    737247.00   4072216.00    0.00
   DISCCART    735610.00   4074256.00    0.00
   DISCCART    735610.00   4074256.00    0.00
   DISCCART    738884.00   4071994.00    0.00
   DISCCART    739812.00   4071686.00    0.00
   DISCCART    739802.00   4072537.00    0.00
   DISCCART    739762.00   4072580.00    0.00
   DISCCART    739738.00   4072804.00    0.00
   DISCCART    742097.00   4072010.00    0.00
   DISCCART    734441.00   4075063.00    0.00
   DISCCART    734441.00   4075077.00    0.00
   DISCCART    734433.00   4075098.00    0.00
RE FINISHED
**
**************************************
** AERMOD Meteorology Pathway
**************************************
**
**
ME STARTING
** Surface File Path: C:\Lakes\AERMOD View\r2b\roads\
   SURFFILE Fresno.SFC
** Profile File Path: C:\Lakes\AERMOD View\r2b\roads\
   PROFFILE Fresno.PFL
   SURFDATA 93193 2005 FRESNO/AIR_TERMINAL
   UAIRDATA 23230 2005 OAKLAND/WSO_AP
   SITEDATA 0 2005
   PROFBASE 101.0 METERS
ME FINISHED
**
**************************************
** AERMOD Output Pathway
**************************************
**
**
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 1ST
** Auto-Generated Plotfiles
** Plotfile Path: C:\Lakes\AERMOD View\r2b\roads\roads.AD\
   PLOTFILE 1 Bass 1ST roads.AD\01H1G001.PLT 31
   PLOTFILE 1 sanmateo 1ST roads.AD\01H1G002.PLT 32
   PLOTFILE 1 hi180 1ST roads.AD\01H1G003.PLT 33
   PLOTFILE 1 South33 1ST roads.AD\01H1G004.PLT 34
   PLOTFILE 1 North33 1ST roads.AD\01H1G005.PLT 35
   PLOTFILE 1 Overlap 1ST roads.AD\01H1G006.PLT 36
   PLOTFILE ANNUAL Bass roads.AD\AN00G001.PLT 37
   PLOTFILE ANNUAL sanmateo roads.AD\AN00G002.PLT 38
   PLOTFILE ANNUAL hi180 roads.AD\AN00G003.PLT 39
   PLOTFILE ANNUAL South33 roads.AD\AN00G004.PLT 40
   PLOTFILE ANNUAL North33 roads.AD\AN00G005.PLT 41
   PLOTFILE ANNUAL Overlap roads.AD\AN00G006.PLT 42
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   NOHEADER PLOTFILE
   FILEFORM EXP
   SUMMFILE R2BROADS.SUM
OU FINISHED
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** Project Parameters
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** PROJCTN  CoordinateSystemUTM
** DESCPTN  UTM: Universal Transverse Mercator
** DATUM    North American Datum 1983
** DTMRGN   CONUS
** UNITS    m
** ZONE     10
** ZONEINX  0
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** AERMOD Input Produced by:
** AERMOD View Ver. 8.1.0
** Lakes Environmental Software Inc.
** Date: 2/7/2013
** File: C:\Lakes\AERMOD View\r2b\flood\Flood\flood\flood.ADI
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**
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** AERMOD Control Pathway
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**
**
CO STARTING
   TITLEONE R2B OTHER
   MODELOPT CONC FLAT
   AVERTIME 1 ANNUAL
   POLLUTID OTHER
   FLAGPOLE 1.80
   RUNORNOT RUN
** Error File Path: C:\Lakes\AERMOD View\r2b\flood\Flood\flood\
   ERRORFIL flood.err
CO FINISHED
**
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** AERMOD Source Pathway
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**
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SO STARTING
** Source Location **
** Source ID - Type - X Coord. - Y Coord. **
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   LOCATION CNS002       VOLUME     739824.541  4074104.467          0.0
   LOCATION CNS003       VOLUME     739624.541  4073904.467          0.0
   LOCATION CNS004       VOLUME     739824.541  4073904.467          0.0
   LOCATION CNS005       VOLUME     742224.541  4073104.467          0.0
   LOCATION CNS006       VOLUME     736224.541  4075704.467          0.0
   LOCATION CNS007       VOLUME     736424.541  4075704.467          0.0
   LOCATION CNS008       VOLUME     736824.541  4075704.467          0.0
   LOCATION CNS009       VOLUME     736224.541  4075504.467          0.0
   LOCATION CNS010       VOLUME     736224.541  4075304.467          0.0
   LOCATION CNS011       VOLUME     736224.541  4075104.467          0.0
   LOCATION CNS012       VOLUME     736424.541  4075104.467          0.0
   LOCATION CNS013       VOLUME     736424.541  4074904.467          0.0
   LOCATION CNS014       VOLUME     736424.541  4074904.467          0.0
   LOCATION CNS015       VOLUME     736224.541  4074704.467          0.0
   LOCATION CNS016       VOLUME     736424.541  4074704.467          0.0
   LOCATION CNS017       VOLUME     738824.541  4074704.467          0.0
   LOCATION CNS018       VOLUME     735824.541  4074504.467          0.0
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LOCATION	CNS020	VOLUME	735424.541	4074304.467	0.0
LOCATION	CNS021	VOLUME	738824.541	4073304.467	0.0
LOCATION	CNS022	VOLUME	742224.541	4073104.467	0.0
LOCATION	CNS023	VOLUME	742224.541	4072904.467	0.0
LOCATION	CNS024	VOLUME	736424.541	4075704.467	0.0
LOCATION	CNS025	VOLUME	735824.541	4074504.467	0.0
LOCATION	CNS026	VOLUME	738024.541	4074304.467	0.0
LOCATION	CNS027	VOLUME	736624.541	4074104.467	0.0
LOCATION	CNS028	VOLUME	736824.541	4074104.467	0.0
LOCATION	CNS029	VOLUME	737824.541	4074104.467	0.0
LOCATION	CNS030	VOLUME	738024.541	4074104.467	0.0
LOCATION	CNS031	VOLUME	738224.541	4074104.467	0.0
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LOCATION	CNS034	VOLUME	742224.541	4073104.467	0.0
LOCATION	CNS035	VOLUME	740224.541	4072904.467	0.0
LOCATION	CNS036	VOLUME	740424.541	4072904.467	0.0
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LOCATION	CNS041	VOLUME	740824.541	4072704.467	0.0
LOCATION	CNS042	VOLUME	741024.541	4072704.467	0.0
LOCATION	CNS043	VOLUME	740224.541	4072504.467	0.0
LOCATION	CNS044	VOLUME	740424.541	4072504.467	0.0
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LOCATION	CNS046	VOLUME	736424.541	4075704.467	0.0
LOCATION	CNS047	VOLUME	736624.541	4075704.467	0.0
LOCATION	CNS048	VOLUME	736824.541	4075704.467	0.0
LOCATION	CNS049	VOLUME	736224.541	4075504.467	0.0
LOCATION	CNS050	VOLUME	736424.541	4075504.467	0.0
LOCATION	CNS051	VOLUME	736624.541	4075504.467	0.0
LOCATION	CNS052	VOLUME	736824.541	4075504.467	0.0
LOCATION	CNS053	VOLUME	736224.541	4075304.467	0.0
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LOCATION	CNS055	VOLUME	736624.541	4075304.467	0.0
LOCATION	CNS056	VOLUME	736824.541	4075304.467	0.0
LOCATION	CNS057	VOLUME	736224.541	4075104.467	0.0
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LOCATION	CNS059	VOLUME	736624.541	4075104.467	0.0
LOCATION	CNS060	VOLUME	736824.541	4075104.467	0.0
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LOCATION	CNS062	VOLUME	737224.541	4075104.467	0.0
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LOCATION	CNS064	VOLUME	737624.541	4075104.467	0.0
LOCATION	CNS065	VOLUME	737824.541	4075104.467	0.0
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LOCATION	CNS067	VOLUME	736624.541	4074904.467	0.0
LOCATION	CNS068	VOLUME	736824.541	4074904.467	0.0
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LOCATION	CNS070	VOLUME	737224.541	4074904.467	0.0
LOCATION	CNS071	VOLUME	737424.541	4074904.467	0.0
LOCATION	CNS072	VOLUME	737624.541	4074904.467	0.0

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LOCATION CNS077	VOLUME	736824.541	4074704.467	0.0
LOCATION CNS078	VOLUME	737024.541	4074704.467	0.0
LOCATION CNS079	VOLUME	737224.541	4074704.467	0.0
LOCATION CNS080	VOLUME	737424.541	4074704.467	0.0
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LOCATION CNS084	VOLUME	738624.541	4074704.467	0.0
LOCATION CNS085	VOLUME	738824.541	4074704.467	0.0
LOCATION CNS086	VOLUME	735624.541	4074504.467	0.0
LOCATION CNS087	VOLUME	735824.541	4074504.467	0.0
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LOCATION CNS129	VOLUME	736624.541	4074104.467	0.0
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LOCATION CNS155	VOLUME	739224.541	4073904.467	0.0
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LOCATION	CNS188	VOLUME	741024.541	4073504.467	0.0
LOCATION	CNS189	VOLUME	738824.541	4073304.467	0.0
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LOCATION	CNS194	VOLUME	739824.541	4073304.467	0.0
LOCATION	CNS195	VOLUME	740024.541	4073304.467	0.0
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LOCATION	CNS198	VOLUME	740624.541	4073304.467	0.0
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LOCATION	CNS202	VOLUME	741424.541	4073304.467	0.0
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LOCATION	CNS206	VOLUME	740824.541	4073104.467	0.0
LOCATION	CNS207	VOLUME	741024.541	4073104.467	0.0
LOCATION	CNS208	VOLUME	741224.541	4073104.467	0.0
LOCATION	CNS209	VOLUME	741424.541	4073104.467	0.0
LOCATION	CNS210	VOLUME	741624.541	4073104.467	0.0
LOCATION	CNS211	VOLUME	741824.541	4073104.467	0.0
LOCATION	CNS212	VOLUME	742024.541	4073104.467	0.0
LOCATION	CNS213	VOLUME	742224.541	4073104.467	0.0
LOCATION	CNS214	VOLUME	740224.541	4072904.467	0.0
LOCATION	CNS215	VOLUME	740424.541	4072904.467	0.0
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LOCATION	CNS220	VOLUME	741424.541	4072904.467	0.0
LOCATION	CNS221	VOLUME	741624.541	4072904.467	0.0
LOCATION	CNS222	VOLUME	741824.541	4072904.467	0.0
LOCATION	CNS223	VOLUME	742024.541	4072904.467	0.0
LOCATION	CNS224	VOLUME	740224.541	4072704.467	0.0
LOCATION	CNS225	VOLUME	740424.541	4072704.467	0.0
LOCATION	CNS226	VOLUME	740624.541	4072704.467	0.0
LOCATION	CNS227	VOLUME	740824.541	4072704.467	0.0
LOCATION	CNS228	VOLUME	741024.541	4072704.467	0.0
LOCATION	CNS229	VOLUME	741224.541	4072704.467	0.0
LOCATION	CNS230	VOLUME	741424.541	4072704.467	0.0
LOCATION	CNS231	VOLUME	741624.541	4072704.467	0.0
LOCATION	CNS232	VOLUME	741824.541	4072704.467	0.0
LOCATION	CNS233	VOLUME	740224.541	4072504.467	0.0
LOCATION	CNS234	VOLUME	740424.541	4072504.467	0.0

LOCATION	CNS235	VOLUME	740624.541	4072504.467	0.0
LOCATION	CNS236	VOLUME	740824.541	4072504.467	0.0
LOCATION	CNS237	VOLUME	741224.541	4072504.467	0.0
LOCATION	CNS238	VOLUME	741424.541	4072504.467	0.0
LOCATION	CNS239	VOLUME	741624.541	4072504.467	0.0
LOCATION	CNS240	VOLUME	741824.541	4072504.467	0.0
LOCATION	CNS241	VOLUME	741224.541	4072304.467	0.0
LOCATION	CNS242	VOLUME	741424.541	4072304.467	0.0
LOCATION	CNS243	VOLUME	741624.541	4072304.467	0.0
LOCATION	CNS244	VOLUME	741824.541	4072304.467	0.0
LOCATION	CNS245	VOLUME	742024.541	4072304.467	0.0
LOCATION	CNS246	VOLUME	741224.541	4072104.467	0.0
LOCATION	CNS247	VOLUME	741424.541	4072104.467	0.0
LOCATION	CNS248	VOLUME	741624.541	4072104.467	0.0
LOCATION	CNS249	VOLUME	741824.541	4072104.467	0.0
LOCATION	CNS250	VOLUME	742024.541	4072104.467	0.0
LOCATION	CNS251	VOLUME	741424.541	4071904.467	0.0
LOCATION	CNS252	VOLUME	741624.541	4071904.467	0.0
LOCATION	CNS253	VOLUME	741824.541	4071904.467	0.0
LOCATION	CNS254	VOLUME	742024.541	4071904.467	0.0
LOCATION	CWB001	VOLUME	735624.541	4074104.467	0.0
LOCATION	CWB002	VOLUME	735824.541	4074104.467	0.0
LOCATION	CWB003	VOLUME	736024.541	4074104.467	0.0
LOCATION	CWB004	VOLUME	736224.541	4074104.467	0.0
LOCATION	CWB005	VOLUME	736624.541	4074104.467	0.0
LOCATION	CWB006	VOLUME	736824.541	4074104.467	0.0
LOCATION	CWB007	VOLUME	736224.541	4073904.467	0.0
LOCATION	CWB008	VOLUME	736424.541	4073904.467	0.0
LOCATION	CWB009	VOLUME	737824.541	4073904.467	0.0
LOCATION	CWB010	VOLUME	738024.541	4073904.467	0.0
LOCATION	CWB011	VOLUME	737824.541	4073704.467	0.0
LOCATION	CWB012	VOLUME	738024.541	4073704.467	0.0
LOCATION	CWB013	VOLUME	739624.541	4072904.467	0.0
LOCATION	CWB014	VOLUME	739824.541	4072704.467	0.0
LOCATION	CWB015	VOLUME	740024.541	4072704.467	0.0
LOCATION	CWB016	VOLUME	740224.541	4072704.467	0.0
LOCATION	CWB017	VOLUME	740824.541	4072704.467	0.0
LOCATION	CWB018	VOLUME	741024.541	4072704.467	0.0
LOCATION	CWB019	VOLUME	740824.541	4072504.467	0.0
LOCATION	CWB020	VOLUME	741024.541	4072504.467	0.0
LOCATION	CWB021	VOLUME	740624.541	4072304.467	0.0
LOCATION	CWB022	VOLUME	740824.541	4072304.467	0.0
LOCATION	CWB023	VOLUME	741024.541	4072304.467	0.0
LOCATION	CWB024	VOLUME	736224.541	4075704.467	0.0
LOCATION	CWB025	VOLUME	736424.541	4075704.467	0.0
LOCATION	CWB026	VOLUME	736824.541	4075704.467	0.0
LOCATION	CWB027	VOLUME	736224.541	4075504.467	0.0
LOCATION	CWB028	VOLUME	736824.541	4075504.467	0.0
LOCATION	CWB029	VOLUME	737024.541	4075504.467	0.0
LOCATION	CWB030	VOLUME	736224.541	4075304.467	0.0
LOCATION	CWB031	VOLUME	736824.541	4075304.467	0.0
LOCATION	CWB032	VOLUME	737024.541	4075304.467	0.0
LOCATION	CWB033	VOLUME	737224.541	4075304.467	0.0
LOCATION	CWB034	VOLUME	736424.541	4075104.467	0.0

LOCATION	CWB035	VOLUME	736824.541	4075104.467	0.0
LOCATION	CWB036	VOLUME	737024.541	4075104.467	0.0
LOCATION	CWB037	VOLUME	737224.541	4075104.467	0.0
LOCATION	CWB038	VOLUME	737424.541	4075104.467	0.0
LOCATION	CWB039	VOLUME	736424.541	4074904.467	0.0
LOCATION	CWB040	VOLUME	737824.541	4074904.467	0.0
LOCATION	CWB041	VOLUME	738224.541	4074904.467	0.0
LOCATION	CWB042	VOLUME	738424.541	4074904.467	0.0
LOCATION	CWB043	VOLUME	738624.541	4074904.467	0.0
LOCATION	CWB044	VOLUME	736224.541	4074704.467	0.0
LOCATION	CWB045	VOLUME	736424.541	4074704.467	0.0
LOCATION	CWB046	VOLUME	737824.541	4074704.467	0.0
LOCATION	CWB047	VOLUME	738024.541	4074704.467	0.0
LOCATION	CWB048	VOLUME	738224.541	4074704.467	0.0
LOCATION	CWB049	VOLUME	738424.541	4074704.467	0.0
LOCATION	CWB050	VOLUME	738624.541	4074704.467	0.0
LOCATION	CWB051	VOLUME	738824.541	4074704.467	0.0
LOCATION	CWB052	VOLUME	735824.541	4074504.467	0.0
LOCATION	CWB053	VOLUME	736024.541	4074504.467	0.0
LOCATION	CWB054	VOLUME	737824.541	4074504.467	0.0
LOCATION	CWB055	VOLUME	738024.541	4074504.467	0.0
LOCATION	CWB056	VOLUME	738224.541	4074504.467	0.0
LOCATION	CWB057	VOLUME	738424.541	4074504.467	0.0
LOCATION	CWB058	VOLUME	735424.541	4074304.467	0.0
LOCATION	CWB059	VOLUME	735424.541	4074104.467	0.0
LOCATION	CWB060	VOLUME	735624.541	4074104.467	0.0
LOCATION	CWB061	VOLUME	735824.541	4074104.467	0.0
LOCATION	CWB062	VOLUME	736024.541	4074104.467	0.0
LOCATION	CWB063	VOLUME	736224.541	4074104.467	0.0
LOCATION	CWB064	VOLUME	736424.541	4074104.467	0.0
LOCATION	CWB065	VOLUME	736624.541	4074104.467	0.0
LOCATION	CWB066	VOLUME	736824.541	4074104.467	0.0
LOCATION	CWB067	VOLUME	737024.541	4074104.467	0.0
LOCATION	CWB068	VOLUME	737224.541	4074104.467	0.0
LOCATION	CWB069	VOLUME	737424.541	4074104.467	0.0
LOCATION	CWB070	VOLUME	737624.541	4074104.467	0.0
LOCATION	CWB071	VOLUME	736224.541	4073904.467	0.0
LOCATION	CWB072	VOLUME	736424.541	4073904.467	0.0
LOCATION	CWB073	VOLUME	736624.541	4073904.467	0.0
LOCATION	CWB074	VOLUME	737424.541	4073904.467	0.0
LOCATION	CWB075	VOLUME	737624.541	4073904.467	0.0
LOCATION	CWB076	VOLUME	737824.541	4073904.467	0.0
LOCATION	CWB077	VOLUME	738024.541	4073904.467	0.0
LOCATION	CWB078	VOLUME	738224.541	4073904.467	0.0
LOCATION	CWB079	VOLUME	737824.541	4073704.467	0.0
LOCATION	CWB080	VOLUME	738024.541	4073704.467	0.0
LOCATION	CWB081	VOLUME	738224.541	4073704.467	0.0
LOCATION	CWB082	VOLUME	738424.541	4073704.467	0.0
LOCATION	CWB083	VOLUME	738624.541	4073704.467	0.0
LOCATION	CWB084	VOLUME	740824.541	4073704.467	0.0
LOCATION	CWB085	VOLUME	741024.541	4073704.467	0.0
LOCATION	CWB086	VOLUME	741224.541	4073704.467	0.0
LOCATION	CWB087	VOLUME	741424.541	4073704.467	0.0
LOCATION	CWB088	VOLUME	738024.541	4073504.467	0.0

LOCATION CWB089	VOLUME	738224.541	4073504.467	0.0
LOCATION CWB090	VOLUME	738424.541	4073504.467	0.0
LOCATION CWB091	VOLUME	738624.541	4073504.467	0.0
LOCATION CWB092	VOLUME	738824.541	4073504.467	0.0
LOCATION CWB093	VOLUME	740824.541	4073504.467	0.0
LOCATION CWB094	VOLUME	741024.541	4073504.467	0.0
LOCATION CWB095	VOLUME	741224.541	4073504.467	0.0
LOCATION CWB096	VOLUME	741424.541	4073504.467	0.0
LOCATION CWB097	VOLUME	741624.541	4073504.467	0.0
LOCATION CWB098	VOLUME	741824.541	4073504.467	0.0
LOCATION CWB099	VOLUME	738024.541	4073304.467	0.0
LOCATION CWB100	VOLUME	738224.541	4073304.467	0.0
LOCATION CWB101	VOLUME	738424.541	4073304.467	0.0
LOCATION CWB102	VOLUME	738624.541	4073304.467	0.0
LOCATION CWB103	VOLUME	738824.541	4073304.467	0.0
LOCATION CWB104	VOLUME	739024.541	4073304.467	0.0
LOCATION CWB105	VOLUME	739224.541	4073304.467	0.0
LOCATION CWB106	VOLUME	739424.541	4073304.467	0.0
LOCATION CWB107	VOLUME	739624.541	4073304.467	0.0
LOCATION CWB108	VOLUME	739824.541	4073304.467	0.0
LOCATION CWB109	VOLUME	740024.541	4073304.467	0.0
LOCATION CWB110	VOLUME	740224.541	4073304.467	0.0
LOCATION CWB111	VOLUME	741024.541	4073304.467	0.0
LOCATION CWB112	VOLUME	741224.541	4073304.467	0.0
LOCATION CWB113	VOLUME	741424.541	4073304.467	0.0
LOCATION CWB114	VOLUME	741624.541	4073304.467	0.0
LOCATION CWB115	VOLUME	741824.541	4073304.467	0.0
LOCATION CWB116	VOLUME	738824.541	4073104.467	0.0
LOCATION CWB117	VOLUME	739024.541	4073104.467	0.0
LOCATION CWB118	VOLUME	739224.541	4073104.467	0.0
LOCATION CWB119	VOLUME	739424.541	4073104.467	0.0
LOCATION CWB120	VOLUME	739624.541	4073104.467	0.0
LOCATION CWB121	VOLUME	739824.541	4073104.467	0.0
LOCATION CWB122	VOLUME	740024.541	4073104.467	0.0
LOCATION CWB123	VOLUME	740224.541	4073104.467	0.0
LOCATION CWB124	VOLUME	741424.541	4073104.467	0.0
LOCATION CWB125	VOLUME	741624.541	4073104.467	0.0
LOCATION CWB126	VOLUME	741824.541	4073104.467	0.0
LOCATION CWB127	VOLUME	742024.541	4073104.467	0.0
LOCATION CWB128	VOLUME	742224.541	4073104.467	0.0
LOCATION CWB129	VOLUME	738824.541	4072904.467	0.0
LOCATION CWB130	VOLUME	739024.541	4072904.467	0.0
LOCATION CWB131	VOLUME	739224.541	4072904.467	0.0
LOCATION CWB132	VOLUME	739424.541	4072904.467	0.0
LOCATION CWB133	VOLUME	739624.541	4072904.467	0.0
LOCATION CWB134	VOLUME	739824.541	4072904.467	0.0
LOCATION CWB135	VOLUME	740024.541	4072904.467	0.0
LOCATION CWB136	VOLUME	740224.541	4072904.467	0.0
LOCATION CWB137	VOLUME	741024.541	4072904.467	0.0
LOCATION CWB138	VOLUME	741224.541	4072904.467	0.0
LOCATION CWB139	VOLUME	741424.541	4072904.467	0.0
LOCATION CWB140	VOLUME	741624.541	4072904.467	0.0
LOCATION CWB141	VOLUME	739824.541	4072704.467	0.0
LOCATION CWB142	VOLUME	740024.541	4072704.467	0.0

LOCATION	CWB143	VOLUME	740224.541	4072704.467	0.0
LOCATION	CWB144	VOLUME	740824.541	4072704.467	0.0
LOCATION	CWB145	VOLUME	741024.541	4072704.467	0.0
LOCATION	CWB146	VOLUME	741024.541	4072704.467	0.0
LOCATION	CWB147	VOLUME	741224.541	4072704.467	0.0
LOCATION	CWB148	VOLUME	741224.541	4072704.467	0.0
LOCATION	CWB149	VOLUME	740024.541	4072504.467	0.0
LOCATION	CWB150	VOLUME	740224.541	4072504.467	0.0
LOCATION	CWB151	VOLUME	740424.541	4072504.467	0.0
LOCATION	CWB152	VOLUME	740624.541	4072504.467	0.0
LOCATION	CWB153	VOLUME	740824.541	4072504.467	0.0
LOCATION	CWB154	VOLUME	741024.541	4072504.467	0.0
LOCATION	CWB155	VOLUME	741224.541	4072504.467	0.0
LOCATION	CWB156	VOLUME	740024.541	4072304.467	0.0
LOCATION	CWB157	VOLUME	740224.541	4072304.467	0.0
LOCATION	CWB158	VOLUME	740424.541	4072304.467	0.0
LOCATION	CWB159	VOLUME	740624.541	4072304.467	0.0
LOCATION	CWB160	VOLUME	740824.541	4072304.467	0.0
LOCATION	CWB161	VOLUME	741024.541	4072304.467	0.0
LOCATION	CWB162	VOLUME	741224.541	4072304.467	0.0
LOCATION	CWB163	VOLUME	741424.541	4071904.467	0.0
LOCATION	CWB164	VOLUME	736424.541	4075704.467	0.0
LOCATION	CWB165	VOLUME	735824.541	4074504.467	0.0
LOCATION	CWB166	VOLUME	738024.541	4074304.467	0.0
LOCATION	CWB167	VOLUME	736624.541	4074104.467	0.0
LOCATION	CWB168	VOLUME	736824.541	4074104.467	0.0
LOCATION	CWB169	VOLUME	737824.541	4074104.467	0.0
LOCATION	CWB170	VOLUME	738024.541	4074104.467	0.0
LOCATION	CWB171	VOLUME	738224.541	4074104.467	0.0
LOCATION	CWB172	VOLUME	737824.541	4073904.467	0.0
LOCATION	CWB173	VOLUME	738024.541	4073904.467	0.0
LOCATION	CWB174	VOLUME	741424.541	4073304.467	0.0
LOCATION	CWB175	VOLUME	741224.541	4073104.467	0.0
LOCATION	CWB176	VOLUME	741424.541	4073104.467	0.0
LOCATION	CWB177	VOLUME	741624.541	4073104.467	0.0
LOCATION	CWB178	VOLUME	741824.541	4073104.467	0.0
LOCATION	CWB179	VOLUME	742224.541	4073104.467	0.0
LOCATION	CWB180	VOLUME	740224.541	4072904.467	0.0
LOCATION	CWB181	VOLUME	740424.541	4072904.467	0.0
LOCATION	CWB182	VOLUME	741024.541	4072904.467	0.0
LOCATION	CWB183	VOLUME	741224.541	4072904.467	0.0
LOCATION	CWB184	VOLUME	741624.541	4072904.467	0.0
LOCATION	CWB185	VOLUME	740224.541	4072704.467	0.0
LOCATION	CWB186	VOLUME	740424.541	4072704.467	0.0
LOCATION	CWB187	VOLUME	740624.541	4072704.467	0.0
LOCATION	CWB188	VOLUME	740824.541	4072704.467	0.0
LOCATION	CWB189	VOLUME	741024.541	4072704.467	0.0
LOCATION	CWB190	VOLUME	741024.541	4072704.467	0.0
LOCATION	CWB191	VOLUME	741224.541	4072704.467	0.0
LOCATION	CWB192	VOLUME	741424.541	4072704.467	0.0
LOCATION	CWB193	VOLUME	741624.541	4072704.467	0.0
LOCATION	CWB194	VOLUME	740224.541	4072504.467	0.0
LOCATION	CWB195	VOLUME	740424.541	4072504.467	0.0
LOCATION	CWB196	VOLUME	741424.541	4072504.467	0.0

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LOCATION CWB197      VOLUME     741624.541  4072504.467          0.0
LOCATION CWB198      VOLUME     741424.541  4072304.467          0.0
LOCATION CWB199      VOLUME     741424.541  4072104.467          0.0
LOCATION CWB200      VOLUME     741624.541  4072104.467          0.0
LOCATION CWB201      VOLUME     741424.541  4071904.467          0.0
LOCATION CWB202      VOLUME     741624.541  4071904.467          0.0
LOCATION CWB203      VOLUME     736224.541  4075704.467          0.0
LOCATION CWB204      VOLUME     736424.541  4075704.467          0.0
LOCATION CWB205      VOLUME     736624.541  4075704.467          0.0
LOCATION CWB206      VOLUME     736824.541  4075704.467          0.0
LOCATION CWB207      VOLUME     736224.541  4075504.467          0.0
LOCATION CWB208      VOLUME     736424.541  4075504.467          0.0
LOCATION CWB209      VOLUME     736624.541  4075504.467          0.0
LOCATION CWB210      VOLUME     736824.541  4075504.467          0.0
LOCATION CWB211      VOLUME     736224.541  4075304.467          0.0
LOCATION CWB212      VOLUME     736424.541  4075304.467          0.0
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LOCATION CWB214      VOLUME     736824.541  4075304.467          0.0
LOCATION CWB215      VOLUME     736224.541  4075104.467          0.0
LOCATION CWB216      VOLUME     736424.541  4075104.467          0.0
LOCATION CWB217      VOLUME     736624.541  4075104.467          0.0
LOCATION CWB218      VOLUME     736824.541  4075104.467          0.0
LOCATION CWB219      VOLUME     737024.541  4075104.467          0.0
LOCATION CWB220      VOLUME     737224.541  4075104.467          0.0
LOCATION CWB221      VOLUME     737424.541  4075104.467          0.0
LOCATION CWB222      VOLUME     737624.541  4075104.467          0.0
LOCATION CWB223      VOLUME     737824.541  4075104.467          0.0
LOCATION CWB224      VOLUME     736424.541  4074904.467          0.0
LOCATION CWB225      VOLUME     736624.541  4074904.467          0.0
LOCATION CWB226      VOLUME     736824.541  4074904.467          0.0
LOCATION CWB227      VOLUME     737024.541  4074904.467          0.0
LOCATION CWB228      VOLUME     737224.541  4074904.467          0.0
LOCATION CWB229      VOLUME     737424.541  4074904.467          0.0
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LOCATION CWB231      VOLUME     737824.541  4074904.467          0.0
LOCATION CWB232      VOLUME     736224.541  4074704.467          0.0
LOCATION CWB233      VOLUME     736424.541  4074704.467          0.0
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LOCATION CWB235      VOLUME     736824.541  4074704.467          0.0
LOCATION CWB236      VOLUME     737024.541  4074704.467          0.0
LOCATION CWB237      VOLUME     737224.541  4074704.467          0.0
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LOCATION CWB240      VOLUME     737824.541  4074704.467          0.0
LOCATION CWB241      VOLUME     738424.541  4074704.467          0.0
LOCATION CWB242      VOLUME     738624.541  4074704.467          0.0
LOCATION CWB243      VOLUME     738824.541  4074704.467          0.0
LOCATION CWB244      VOLUME     735624.541  4074504.467          0.0
LOCATION CWB245      VOLUME     735824.541  4074504.467          0.0
LOCATION CWB246      VOLUME     736024.541  4074504.467          0.0
LOCATION CWB247      VOLUME     736224.541  4074504.467          0.0
LOCATION CWB248      VOLUME     736424.541  4074504.467          0.0
LOCATION CWB249      VOLUME     736624.541  4074504.467          0.0
LOCATION CWB250      VOLUME     736824.541  4074504.467          0.0
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LOCATION	CWB251	VOLUME	737024.541	4074504.467	0.0
LOCATION	CWB252	VOLUME	737224.541	4074504.467	0.0
LOCATION	CWB253	VOLUME	737424.541	4074504.467	0.0
LOCATION	CWB254	VOLUME	737624.541	4074504.467	0.0
LOCATION	CWB255	VOLUME	737824.541	4074504.467	0.0
LOCATION	CWB256	VOLUME	738024.541	4074504.467	0.0
LOCATION	CWB257	VOLUME	738224.541	4074504.467	0.0
LOCATION	CWB258	VOLUME	738424.541	4074504.467	0.0
LOCATION	CWB259	VOLUME	738624.541	4074504.467	0.0
LOCATION	CWB260	VOLUME	738824.541	4074504.467	0.0
LOCATION	CWB261	VOLUME	739024.541	4074504.467	0.0
LOCATION	CWB262	VOLUME	735424.541	4074304.467	0.0
LOCATION	CWB263	VOLUME	735624.541	4074304.467	0.0
LOCATION	CWB264	VOLUME	735824.541	4074304.467	0.0
LOCATION	CWB265	VOLUME	736024.541	4074304.467	0.0
LOCATION	CWB266	VOLUME	736224.541	4074304.467	0.0
LOCATION	CWB267	VOLUME	736424.541	4074304.467	0.0
LOCATION	CWB268	VOLUME	736624.541	4074304.467	0.0
LOCATION	CWB269	VOLUME	736824.541	4074304.467	0.0
LOCATION	CWB270	VOLUME	737024.541	4074304.467	0.0
LOCATION	CWB271	VOLUME	737224.541	4074304.467	0.0
LOCATION	CWB272	VOLUME	737424.541	4074304.467	0.0
LOCATION	CWB273	VOLUME	737624.541	4074304.467	0.0
LOCATION	CWB274	VOLUME	737824.541	4074304.467	0.0
LOCATION	CWB275	VOLUME	738024.541	4074304.467	0.0
LOCATION	CWB276	VOLUME	738224.541	4074304.467	0.0
LOCATION	CWB277	VOLUME	738424.541	4074304.467	0.0
LOCATION	CWB278	VOLUME	738624.541	4074304.467	0.0
LOCATION	CWB279	VOLUME	738824.541	4074304.467	0.0
LOCATION	CWB280	VOLUME	739024.541	4074304.467	0.0
LOCATION	CWB281	VOLUME	735424.541	4074104.467	0.0
LOCATION	CWB282	VOLUME	735624.541	4074104.467	0.0
LOCATION	CWB283	VOLUME	735824.541	4074104.467	0.0
LOCATION	CWB284	VOLUME	736024.541	4074104.467	0.0
LOCATION	CWB285	VOLUME	736224.541	4074104.467	0.0
LOCATION	CWB286	VOLUME	736424.541	4074104.467	0.0
LOCATION	CWB287	VOLUME	736624.541	4074104.467	0.0
LOCATION	CWB288	VOLUME	736824.541	4074104.467	0.0
LOCATION	CWB289	VOLUME	737024.541	4074104.467	0.0
LOCATION	CWB290	VOLUME	737224.541	4074104.467	0.0
LOCATION	CWB291	VOLUME	737424.541	4074104.467	0.0
LOCATION	CWB292	VOLUME	737624.541	4074104.467	0.0
LOCATION	CWB293	VOLUME	737824.541	4074104.467	0.0
LOCATION	CWB294	VOLUME	738024.541	4074104.467	0.0
LOCATION	CWB295	VOLUME	738224.541	4074104.467	0.0
LOCATION	CWB296	VOLUME	738424.541	4074104.467	0.0
LOCATION	CWB297	VOLUME	738624.541	4074104.467	0.0
LOCATION	CWB298	VOLUME	738824.541	4074104.467	0.0
LOCATION	CWB299	VOLUME	739024.541	4074104.467	0.0
LOCATION	CWB300	VOLUME	739224.541	4074104.467	0.0
LOCATION	CWB301	VOLUME	739424.541	4074104.467	0.0
LOCATION	CWB302	VOLUME	739624.541	4074104.467	0.0
LOCATION	CWB303	VOLUME	739824.541	4074104.467	0.0
LOCATION	CWB304	VOLUME	740024.541	4074104.467	0.0

LOCATION CWB305	VOLUME	737624.541	4073904.467	0.0
LOCATION CWB306	VOLUME	737824.541	4073904.467	0.0
LOCATION CWB307	VOLUME	738024.541	4073904.467	0.0
LOCATION CWB308	VOLUME	738224.541	4073904.467	0.0
LOCATION CWB309	VOLUME	738424.541	4073904.467	0.0
LOCATION CWB310	VOLUME	738624.541	4073904.467	0.0
LOCATION CWB311	VOLUME	738824.541	4073904.467	0.0
LOCATION CWB312	VOLUME	739024.541	4073904.467	0.0
LOCATION CWB313	VOLUME	739224.541	4073904.467	0.0
LOCATION CWB314	VOLUME	739424.541	4073904.467	0.0
LOCATION CWB315	VOLUME	739624.541	4073904.467	0.0
LOCATION CWB316	VOLUME	739824.541	4073904.467	0.0
LOCATION CWB317	VOLUME	740024.541	4073904.467	0.0
LOCATION CWB318	VOLUME	740224.541	4073904.467	0.0
LOCATION CWB319	VOLUME	740424.541	4073904.467	0.0
LOCATION CWB320	VOLUME	738224.541	4073704.467	0.0
LOCATION CWB321	VOLUME	738424.541	4073704.467	0.0
LOCATION CWB322	VOLUME	738624.541	4073704.467	0.0
LOCATION CWB323	VOLUME	738824.541	4073704.467	0.0
LOCATION CWB324	VOLUME	739024.541	4073704.467	0.0
LOCATION CWB325	VOLUME	739224.541	4073704.467	0.0
LOCATION CWB326	VOLUME	739424.541	4073704.467	0.0
LOCATION CWB327	VOLUME	739624.541	4073704.467	0.0
LOCATION CWB328	VOLUME	739824.541	4073704.467	0.0
LOCATION CWB329	VOLUME	740024.541	4073704.467	0.0
LOCATION CWB330	VOLUME	740224.541	4073704.467	0.0
LOCATION CWB331	VOLUME	740424.541	4073704.467	0.0
LOCATION CWB332	VOLUME	740624.541	4073704.467	0.0
LOCATION CWB333	VOLUME	740824.541	4073704.467	0.0
LOCATION CWB334	VOLUME	738624.541	4073504.467	0.0
LOCATION CWB335	VOLUME	738824.541	4073504.467	0.0
LOCATION CWB336	VOLUME	739024.541	4073504.467	0.0
LOCATION CWB337	VOLUME	739224.541	4073504.467	0.0
LOCATION CWB338	VOLUME	739424.541	4073504.467	0.0
LOCATION CWB339	VOLUME	739624.541	4073504.467	0.0
LOCATION CWB340	VOLUME	739824.541	4073504.467	0.0
LOCATION CWB341	VOLUME	740024.541	4073504.467	0.0
LOCATION CWB342	VOLUME	740224.541	4073504.467	0.0
LOCATION CWB343	VOLUME	740424.541	4073504.467	0.0
LOCATION CWB344	VOLUME	740624.541	4073504.467	0.0
LOCATION CWB345	VOLUME	740824.541	4073504.467	0.0
LOCATION CWB346	VOLUME	741024.541	4073504.467	0.0
LOCATION CWB347	VOLUME	738824.541	4073304.467	0.0
LOCATION CWB348	VOLUME	739024.541	4073304.467	0.0
LOCATION CWB349	VOLUME	739224.541	4073304.467	0.0
LOCATION CWB350	VOLUME	739424.541	4073304.467	0.0
LOCATION CWB351	VOLUME	739624.541	4073304.467	0.0
LOCATION CWB352	VOLUME	739824.541	4073304.467	0.0
LOCATION CWB353	VOLUME	740024.541	4073304.467	0.0
LOCATION CWB354	VOLUME	740224.541	4073304.467	0.0
LOCATION CWB355	VOLUME	740424.541	4073304.467	0.0
LOCATION CWB356	VOLUME	740624.541	4073304.467	0.0
LOCATION CWB357	VOLUME	740824.541	4073304.467	0.0
LOCATION CWB358	VOLUME	741024.541	4073304.467	0.0

LOCATION	CWB359	VOLUME	741224.541	4073304.467	0.0
LOCATION	CWB360	VOLUME	741424.541	4073304.467	0.0
LOCATION	CWB361	VOLUME	740224.541	4073104.467	0.0
LOCATION	CWB362	VOLUME	740424.541	4073104.467	0.0
LOCATION	CWB363	VOLUME	740624.541	4073104.467	0.0
LOCATION	CWB364	VOLUME	740824.541	4073104.467	0.0
LOCATION	CWB365	VOLUME	741024.541	4073104.467	0.0
LOCATION	CWB366	VOLUME	741224.541	4073104.467	0.0
LOCATION	CWB367	VOLUME	741424.541	4073104.467	0.0
LOCATION	CWB368	VOLUME	741624.541	4073104.467	0.0
LOCATION	CWB369	VOLUME	741824.541	4073104.467	0.0
LOCATION	CWB370	VOLUME	742024.541	4073104.467	0.0
LOCATION	CWB371	VOLUME	742224.541	4073104.467	0.0
LOCATION	CWB372	VOLUME	740224.541	4072904.467	0.0
LOCATION	CWB373	VOLUME	740424.541	4072904.467	0.0
LOCATION	CWB374	VOLUME	740624.541	4072904.467	0.0
LOCATION	CWB375	VOLUME	740824.541	4072904.467	0.0
LOCATION	CWB376	VOLUME	741024.541	4072904.467	0.0
LOCATION	CWB377	VOLUME	741224.541	4072904.467	0.0
LOCATION	CWB378	VOLUME	741424.541	4072904.467	0.0
LOCATION	CWB379	VOLUME	741624.541	4072904.467	0.0
LOCATION	CWB380	VOLUME	741824.541	4072904.467	0.0
LOCATION	CWB381	VOLUME	742024.541	4072904.467	0.0
LOCATION	CWB382	VOLUME	740224.541	4072704.467	0.0
LOCATION	CWB383	VOLUME	740424.541	4072704.467	0.0
LOCATION	CWB384	VOLUME	740624.541	4072704.467	0.0
LOCATION	CWB385	VOLUME	740824.541	4072704.467	0.0
LOCATION	CWB386	VOLUME	741024.541	4072704.467	0.0
LOCATION	CWB387	VOLUME	741224.541	4072704.467	0.0
LOCATION	CWB388	VOLUME	741424.541	4072704.467	0.0
LOCATION	CWB389	VOLUME	741624.541	4072704.467	0.0
LOCATION	CWB390	VOLUME	741824.541	4072704.467	0.0
LOCATION	CWB391	VOLUME	740224.541	4072504.467	0.0
LOCATION	CWB392	VOLUME	740424.541	4072504.467	0.0
LOCATION	CWB393	VOLUME	740624.541	4072504.467	0.0
LOCATION	CWB394	VOLUME	740824.541	4072504.467	0.0
LOCATION	CWB395	VOLUME	741224.541	4072504.467	0.0
LOCATION	CWB396	VOLUME	741424.541	4072504.467	0.0
LOCATION	CWB397	VOLUME	741624.541	4072504.467	0.0
LOCATION	CWB398	VOLUME	741824.541	4072504.467	0.0
LOCATION	CWB399	VOLUME	741224.541	4072304.467	0.0
LOCATION	CWB400	VOLUME	741424.541	4072304.467	0.0
LOCATION	CWB401	VOLUME	741624.541	4072304.467	0.0
LOCATION	CWB402	VOLUME	741824.541	4072304.467	0.0
LOCATION	CWB403	VOLUME	742024.541	4072304.467	0.0
LOCATION	CWB404	VOLUME	741224.541	4072104.467	0.0
LOCATION	CWB405	VOLUME	741424.541	4072104.467	0.0
LOCATION	CWB406	VOLUME	741624.541	4072104.467	0.0
LOCATION	CWB407	VOLUME	741824.541	4072104.467	0.0
LOCATION	CWB408	VOLUME	742024.541	4072104.467	0.0
LOCATION	CWB409	VOLUME	741424.541	4071904.467	0.0
LOCATION	CWB410	VOLUME	741624.541	4071904.467	0.0
LOCATION	CWB411	VOLUME	741824.541	4071904.467	0.0
LOCATION	CWB412	VOLUME	742024.541	4071904.467	0.0

LOCATION	FNS001	VOLUME	736424.541	4074904.467	0.0
LOCATION	FNS002	VOLUME	741424.541	4071904.467	0.0
LOCATION	FNS003	VOLUME	736224.541	4075704.467	0.0
LOCATION	FNS004	VOLUME	736424.541	4075704.467	0.0
LOCATION	FNS005	VOLUME	736824.541	4075704.467	0.0
LOCATION	FNS006	VOLUME	736224.541	4075504.467	0.0
LOCATION	FNS007	VOLUME	736224.541	4075304.467	0.0
LOCATION	FNS008	VOLUME	736224.541	4075104.467	0.0
LOCATION	FNS009	VOLUME	736424.541	4075104.467	0.0
LOCATION	FNS010	VOLUME	736424.541	4074904.467	0.0
LOCATION	FNS011	VOLUME	736424.541	4074904.467	0.0
LOCATION	FNS012	VOLUME	736224.541	4074704.467	0.0
LOCATION	FNS013	VOLUME	736424.541	4074704.467	0.0
LOCATION	FNS014	VOLUME	738824.541	4074704.467	0.0
LOCATION	FNS015	VOLUME	736024.541	4074504.467	0.0
LOCATION	FNS016	VOLUME	736224.541	4074504.467	0.0
LOCATION	FNS017	VOLUME	735424.541	4074304.467	0.0
LOCATION	FNS018	VOLUME	738824.541	4073304.467	0.0
LOCATION	FNS019	VOLUME	742224.541	4073104.467	0.0
LOCATION	FNS020	VOLUME	741024.541	4072904.467	0.0
LOCATION	FNS021	VOLUME	741224.541	4072904.467	0.0
LOCATION	FNS022	VOLUME	741424.541	4072904.467	0.0
LOCATION	FNS023	VOLUME	741624.541	4072904.467	0.0
LOCATION	FNS024	VOLUME	741024.541	4072704.467	0.0
LOCATION	FNS025	VOLUME	741224.541	4072704.467	0.0
LOCATION	FNS026	VOLUME	738024.541	4074304.467	0.0
LOCATION	FNS027	VOLUME	736624.541	4074104.467	0.0
LOCATION	FNS028	VOLUME	736824.541	4074104.467	0.0
LOCATION	FNS029	VOLUME	737824.541	4074104.467	0.0
LOCATION	FNS030	VOLUME	738024.541	4074104.467	0.0
LOCATION	FNS031	VOLUME	738224.541	4074104.467	0.0
LOCATION	FNS032	VOLUME	737824.541	4073904.467	0.0
LOCATION	FNS033	VOLUME	738024.541	4073904.467	0.0
LOCATION	FNS034	VOLUME	741424.541	4073304.467	0.0
LOCATION	FNS035	VOLUME	741224.541	4073104.467	0.0
LOCATION	FNS036	VOLUME	741424.541	4073104.467	0.0
LOCATION	FNS037	VOLUME	741624.541	4073104.467	0.0
LOCATION	FNS038	VOLUME	741824.541	4073104.467	0.0
LOCATION	FNS039	VOLUME	742224.541	4073104.467	0.0
LOCATION	FNS040	VOLUME	740224.541	4072904.467	0.0
LOCATION	FNS041	VOLUME	740424.541	4072904.467	0.0
LOCATION	FNS042	VOLUME	741024.541	4072904.467	0.0
LOCATION	FNS043	VOLUME	741224.541	4072904.467	0.0
LOCATION	FNS044	VOLUME	741624.541	4072904.467	0.0
LOCATION	FNS045	VOLUME	740224.541	4072704.467	0.0
LOCATION	FNS046	VOLUME	740424.541	4072704.467	0.0
LOCATION	FNS047	VOLUME	740624.541	4072704.467	0.0
LOCATION	FNS048	VOLUME	740824.541	4072704.467	0.0
LOCATION	FNS049	VOLUME	741024.541	4072704.467	0.0
LOCATION	FNS050	VOLUME	741024.541	4072704.467	0.0
LOCATION	FNS051	VOLUME	741224.541	4072704.467	0.0
LOCATION	FNS052	VOLUME	741424.541	4072704.467	0.0
LOCATION	FNS053	VOLUME	741624.541	4072704.467	0.0
LOCATION	FNS054	VOLUME	740224.541	4072504.467	0.0

LOCATION	FNS055	VOLUME	740424.541	4072504.467	0.0
LOCATION	FNS056	VOLUME	741424.541	4072504.467	0.0
LOCATION	FNS057	VOLUME	741624.541	4072504.467	0.0
LOCATION	FNS058	VOLUME	741424.541	4072304.467	0.0
LOCATION	FNS059	VOLUME	741424.541	4072104.467	0.0
LOCATION	FNS060	VOLUME	741624.541	4072104.467	0.0
LOCATION	FNS061	VOLUME	741424.541	4071904.467	0.0
LOCATION	FNS062	VOLUME	741624.541	4071904.467	0.0
LOCATION	FNS063	VOLUME	736224.541	4075704.467	0.0
LOCATION	FNS064	VOLUME	736424.541	4075704.467	0.0
LOCATION	FNS065	VOLUME	736624.541	4075704.467	0.0
LOCATION	FNS066	VOLUME	736824.541	4075704.467	0.0
LOCATION	FNS067	VOLUME	736224.541	4075504.467	0.0
LOCATION	FNS068	VOLUME	736424.541	4075504.467	0.0
LOCATION	FNS069	VOLUME	736624.541	4075504.467	0.0
LOCATION	FNS070	VOLUME	736824.541	4075504.467	0.0
LOCATION	FNS071	VOLUME	736224.541	4075304.467	0.0
LOCATION	FNS072	VOLUME	736424.541	4075304.467	0.0
LOCATION	FNS073	VOLUME	736624.541	4075304.467	0.0
LOCATION	FNS074	VOLUME	736824.541	4075304.467	0.0
LOCATION	FNS075	VOLUME	736224.541	4075104.467	0.0
LOCATION	FNS076	VOLUME	736424.541	4075104.467	0.0
LOCATION	FNS077	VOLUME	736624.541	4075104.467	0.0
LOCATION	FNS078	VOLUME	736824.541	4075104.467	0.0
LOCATION	FNS079	VOLUME	737024.541	4075104.467	0.0
LOCATION	FNS080	VOLUME	737224.541	4075104.467	0.0
LOCATION	FNS081	VOLUME	737424.541	4075104.467	0.0
LOCATION	FNS082	VOLUME	737624.541	4075104.467	0.0
LOCATION	FNS083	VOLUME	737824.541	4075104.467	0.0
LOCATION	FNS084	VOLUME	736424.541	4074904.467	0.0
LOCATION	FNS085	VOLUME	736624.541	4074904.467	0.0
LOCATION	FNS086	VOLUME	736824.541	4074904.467	0.0
LOCATION	FNS087	VOLUME	737024.541	4074904.467	0.0
LOCATION	FNS088	VOLUME	737224.541	4074904.467	0.0
LOCATION	FNS089	VOLUME	737424.541	4074904.467	0.0
LOCATION	FNS090	VOLUME	737624.541	4074904.467	0.0
LOCATION	FNS091	VOLUME	737824.541	4074904.467	0.0
LOCATION	FNS092	VOLUME	736224.541	4074704.467	0.0
LOCATION	FNS093	VOLUME	736424.541	4074704.467	0.0
LOCATION	FNS094	VOLUME	736624.541	4074704.467	0.0
LOCATION	FNS095	VOLUME	736824.541	4074704.467	0.0
LOCATION	FNS096	VOLUME	737024.541	4074704.467	0.0
LOCATION	FNS097	VOLUME	737224.541	4074704.467	0.0
LOCATION	FNS098	VOLUME	737424.541	4074704.467	0.0
LOCATION	FNS099	VOLUME	737624.541	4074704.467	0.0
LOCATION	FNS100	VOLUME	737824.541	4074704.467	0.0
LOCATION	FNS101	VOLUME	738424.541	4074704.467	0.0
LOCATION	FNS102	VOLUME	738624.541	4074704.467	0.0
LOCATION	FNS103	VOLUME	738824.541	4074704.467	0.0
LOCATION	FNS104	VOLUME	735624.541	4074504.467	0.0
LOCATION	FNS105	VOLUME	735824.541	4074504.467	0.0
LOCATION	FNS106	VOLUME	736024.541	4074504.467	0.0
LOCATION	FNS107	VOLUME	736224.541	4074504.467	0.0
LOCATION	FNS108	VOLUME	736424.541	4074504.467	0.0

LOCATION	FNS109	VOLUME	736624.541	4074504.467	0.0
LOCATION	FNS110	VOLUME	736824.541	4074504.467	0.0
LOCATION	FNS111	VOLUME	737024.541	4074504.467	0.0
LOCATION	FNS112	VOLUME	737224.541	4074504.467	0.0
LOCATION	FNS113	VOLUME	737424.541	4074504.467	0.0
LOCATION	FNS114	VOLUME	737624.541	4074504.467	0.0
LOCATION	FNS115	VOLUME	737824.541	4074504.467	0.0
LOCATION	FNS116	VOLUME	738024.541	4074504.467	0.0
LOCATION	FNS117	VOLUME	738224.541	4074504.467	0.0
LOCATION	FNS118	VOLUME	738424.541	4074504.467	0.0
LOCATION	FNS119	VOLUME	738624.541	4074504.467	0.0
LOCATION	FNS120	VOLUME	738824.541	4074504.467	0.0
LOCATION	FNS121	VOLUME	739024.541	4074504.467	0.0
LOCATION	FNS122	VOLUME	735424.541	4074304.467	0.0
LOCATION	FNS123	VOLUME	735624.541	4074304.467	0.0
LOCATION	FNS124	VOLUME	735824.541	4074304.467	0.0
LOCATION	FNS125	VOLUME	736024.541	4074304.467	0.0
LOCATION	FNS126	VOLUME	736224.541	4074304.467	0.0
LOCATION	FNS127	VOLUME	736424.541	4074304.467	0.0
LOCATION	FNS128	VOLUME	736624.541	4074304.467	0.0
LOCATION	FNS129	VOLUME	736824.541	4074304.467	0.0
LOCATION	FNS130	VOLUME	737024.541	4074304.467	0.0
LOCATION	FNS131	VOLUME	737224.541	4074304.467	0.0
LOCATION	FNS132	VOLUME	737424.541	4074304.467	0.0
LOCATION	FNS133	VOLUME	737624.541	4074304.467	0.0
LOCATION	FNS134	VOLUME	737824.541	4074304.467	0.0
LOCATION	FNS135	VOLUME	738024.541	4074304.467	0.0
LOCATION	FNS136	VOLUME	738224.541	4074304.467	0.0
LOCATION	FNS137	VOLUME	738424.541	4074304.467	0.0
LOCATION	FNS138	VOLUME	738624.541	4074304.467	0.0
LOCATION	FNS139	VOLUME	738824.541	4074304.467	0.0
LOCATION	FNS140	VOLUME	739024.541	4074304.467	0.0
LOCATION	FNS141	VOLUME	735424.541	4074104.467	0.0
LOCATION	FNS142	VOLUME	735624.541	4074104.467	0.0
LOCATION	FNS143	VOLUME	735824.541	4074104.467	0.0
LOCATION	FNS144	VOLUME	736024.541	4074104.467	0.0
LOCATION	FNS145	VOLUME	736224.541	4074104.467	0.0
LOCATION	FNS146	VOLUME	736424.541	4074104.467	0.0
LOCATION	FNS147	VOLUME	736624.541	4074104.467	0.0
LOCATION	FNS148	VOLUME	736824.541	4074104.467	0.0
LOCATION	FNS149	VOLUME	737024.541	4074104.467	0.0
LOCATION	FNS150	VOLUME	737224.541	4074104.467	0.0
LOCATION	FNS151	VOLUME	737424.541	4074104.467	0.0
LOCATION	FNS152	VOLUME	737624.541	4074104.467	0.0
LOCATION	FNS153	VOLUME	737824.541	4074104.467	0.0
LOCATION	FNS154	VOLUME	738024.541	4074104.467	0.0
LOCATION	FNS155	VOLUME	738224.541	4074104.467	0.0
LOCATION	FNS156	VOLUME	738424.541	4074104.467	0.0
LOCATION	FNS157	VOLUME	738624.541	4074104.467	0.0
LOCATION	FNS158	VOLUME	738824.541	4074104.467	0.0
LOCATION	FNS159	VOLUME	739024.541	4074104.467	0.0
LOCATION	FNS160	VOLUME	739224.541	4074104.467	0.0
LOCATION	FNS161	VOLUME	739424.541	4074104.467	0.0
LOCATION	FNS162	VOLUME	739624.541	4074104.467	0.0

LOCATION	FNS163	VOLUME	739824.541	4074104.467	0.0
LOCATION	FNS164	VOLUME	740024.541	4074104.467	0.0
LOCATION	FNS165	VOLUME	737624.541	4073904.467	0.0
LOCATION	FNS166	VOLUME	737824.541	4073904.467	0.0
LOCATION	FNS167	VOLUME	738024.541	4073904.467	0.0
LOCATION	FNS168	VOLUME	738224.541	4073904.467	0.0
LOCATION	FNS169	VOLUME	738424.541	4073904.467	0.0
LOCATION	FNS170	VOLUME	738624.541	4073904.467	0.0
LOCATION	FNS171	VOLUME	738824.541	4073904.467	0.0
LOCATION	FNS172	VOLUME	739024.541	4073904.467	0.0
LOCATION	FNS173	VOLUME	739224.541	4073904.467	0.0
LOCATION	FNS174	VOLUME	739424.541	4073904.467	0.0
LOCATION	FNS175	VOLUME	739624.541	4073904.467	0.0
LOCATION	FNS176	VOLUME	739824.541	4073904.467	0.0
LOCATION	FNS177	VOLUME	740024.541	4073904.467	0.0
LOCATION	FNS178	VOLUME	740224.541	4073904.467	0.0
LOCATION	FNS179	VOLUME	740424.541	4073904.467	0.0
LOCATION	FNS180	VOLUME	738224.541	4073704.467	0.0
LOCATION	FNS181	VOLUME	738424.541	4073704.467	0.0
LOCATION	FNS182	VOLUME	738624.541	4073704.467	0.0
LOCATION	FNS183	VOLUME	738824.541	4073704.467	0.0
LOCATION	FNS184	VOLUME	739024.541	4073704.467	0.0
LOCATION	FNS185	VOLUME	739224.541	4073704.467	0.0
LOCATION	FNS186	VOLUME	739424.541	4073704.467	0.0
LOCATION	FNS187	VOLUME	739624.541	4073704.467	0.0
LOCATION	FNS188	VOLUME	739824.541	4073704.467	0.0
LOCATION	FNS189	VOLUME	740024.541	4073704.467	0.0
LOCATION	FNS190	VOLUME	740224.541	4073704.467	0.0
LOCATION	FNS191	VOLUME	740424.541	4073704.467	0.0
LOCATION	FNS192	VOLUME	740624.541	4073704.467	0.0
LOCATION	FNS193	VOLUME	740824.541	4073704.467	0.0
LOCATION	FNS194	VOLUME	738624.541	4073504.467	0.0
LOCATION	FNS195	VOLUME	738824.541	4073504.467	0.0
LOCATION	FNS196	VOLUME	739024.541	4073504.467	0.0
LOCATION	FNS197	VOLUME	739224.541	4073504.467	0.0
LOCATION	FNS198	VOLUME	739424.541	4073504.467	0.0
LOCATION	FNS199	VOLUME	739624.541	4073504.467	0.0
LOCATION	FNS200	VOLUME	739824.541	4073504.467	0.0
LOCATION	FNS201	VOLUME	740024.541	4073504.467	0.0
LOCATION	FNS202	VOLUME	740224.541	4073504.467	0.0
LOCATION	FNS203	VOLUME	740424.541	4073504.467	0.0
LOCATION	FNS204	VOLUME	740624.541	4073504.467	0.0
LOCATION	FNS205	VOLUME	740824.541	4073504.467	0.0
LOCATION	FNS206	VOLUME	741024.541	4073504.467	0.0
LOCATION	FNS207	VOLUME	738824.541	4073304.467	0.0
LOCATION	FNS208	VOLUME	739024.541	4073304.467	0.0
LOCATION	FNS209	VOLUME	739224.541	4073304.467	0.0
LOCATION	FNS210	VOLUME	739424.541	4073304.467	0.0
LOCATION	FNS211	VOLUME	739624.541	4073304.467	0.0
LOCATION	FNS212	VOLUME	739824.541	4073304.467	0.0
LOCATION	FNS213	VOLUME	740024.541	4073304.467	0.0
LOCATION	FNS214	VOLUME	740224.541	4073304.467	0.0
LOCATION	FNS215	VOLUME	740424.541	4073304.467	0.0
LOCATION	FNS216	VOLUME	740624.541	4073304.467	0.0

LOCATION	FNS217	VOLUME	740824.541	4073304.467	0.0
LOCATION	FNS218	VOLUME	741024.541	4073304.467	0.0
LOCATION	FNS219	VOLUME	741224.541	4073304.467	0.0
LOCATION	FNS220	VOLUME	741424.541	4073304.467	0.0
LOCATION	FNS221	VOLUME	740224.541	4073104.467	0.0
LOCATION	FNS222	VOLUME	740424.541	4073104.467	0.0
LOCATION	FNS223	VOLUME	740624.541	4073104.467	0.0
LOCATION	FNS224	VOLUME	740824.541	4073104.467	0.0
LOCATION	FNS225	VOLUME	741024.541	4073104.467	0.0
LOCATION	FNS226	VOLUME	741224.541	4073104.467	0.0
LOCATION	FNS227	VOLUME	741424.541	4073104.467	0.0
LOCATION	FNS228	VOLUME	741624.541	4073104.467	0.0
LOCATION	FNS229	VOLUME	741824.541	4073104.467	0.0
LOCATION	FNS230	VOLUME	742024.541	4073104.467	0.0
LOCATION	FNS231	VOLUME	742224.541	4073104.467	0.0
LOCATION	FNS232	VOLUME	740224.541	4072904.467	0.0
LOCATION	FNS233	VOLUME	740424.541	4072904.467	0.0
LOCATION	FNS234	VOLUME	740624.541	4072904.467	0.0
LOCATION	FNS235	VOLUME	740824.541	4072904.467	0.0
LOCATION	FNS236	VOLUME	741024.541	4072904.467	0.0
LOCATION	FNS237	VOLUME	741224.541	4072904.467	0.0
LOCATION	FNS238	VOLUME	741424.541	4072904.467	0.0
LOCATION	FNS239	VOLUME	741624.541	4072904.467	0.0
LOCATION	FNS240	VOLUME	741824.541	4072904.467	0.0
LOCATION	FNS241	VOLUME	742024.541	4072904.467	0.0
LOCATION	FNS242	VOLUME	740224.541	4072704.467	0.0
LOCATION	FNS243	VOLUME	740424.541	4072704.467	0.0
LOCATION	FNS244	VOLUME	740624.541	4072704.467	0.0
LOCATION	FNS245	VOLUME	740824.541	4072704.467	0.0
LOCATION	FNS246	VOLUME	741024.541	4072704.467	0.0
LOCATION	FNS247	VOLUME	741224.541	4072704.467	0.0
LOCATION	FNS248	VOLUME	741424.541	4072704.467	0.0
LOCATION	FNS249	VOLUME	741624.541	4072704.467	0.0
LOCATION	FNS250	VOLUME	741824.541	4072704.467	0.0
LOCATION	FNS251	VOLUME	740224.541	4072504.467	0.0
LOCATION	FNS252	VOLUME	740424.541	4072504.467	0.0
LOCATION	FNS253	VOLUME	740624.541	4072504.467	0.0
LOCATION	FNS254	VOLUME	740824.541	4072504.467	0.0
LOCATION	FNS255	VOLUME	741224.541	4072504.467	0.0
LOCATION	FNS256	VOLUME	741424.541	4072504.467	0.0
LOCATION	FNS257	VOLUME	741624.541	4072504.467	0.0
LOCATION	FNS258	VOLUME	741824.541	4072504.467	0.0
LOCATION	FNS259	VOLUME	741224.541	4072304.467	0.0
LOCATION	FNS260	VOLUME	741424.541	4072304.467	0.0
LOCATION	FNS261	VOLUME	741624.541	4072304.467	0.0
LOCATION	FNS262	VOLUME	741824.541	4072304.467	0.0
LOCATION	FNS263	VOLUME	742024.541	4072304.467	0.0
LOCATION	FNS264	VOLUME	741224.541	4072104.467	0.0
LOCATION	FNS265	VOLUME	741424.541	4072104.467	0.0
LOCATION	FNS266	VOLUME	741624.541	4072104.467	0.0
LOCATION	FNS267	VOLUME	741824.541	4072104.467	0.0
LOCATION	FNS268	VOLUME	742024.541	4072104.467	0.0
LOCATION	FNS269	VOLUME	741424.541	4071904.467	0.0
LOCATION	FNS270	VOLUME	741624.541	4071904.467	0.0

LOCATION	FNS271	VOLUME	741824.541	4071904.467	0.0
LOCATION	FNS272	VOLUME	742024.541	4071904.467	0.0
LOCATION	FWN001	VOLUME	735824.541	4074504.467	0.0
LOCATION	FWN002	VOLUME	735424.541	4074304.467	0.0
LOCATION	FWN003	VOLUME	735424.541	4074104.467	0.0
LOCATION	FWN004	VOLUME	736224.541	4075704.467	0.0
LOCATION	FWN005	VOLUME	736424.541	4075704.467	0.0
LOCATION	FWN006	VOLUME	736824.541	4075704.467	0.0
LOCATION	FWN007	VOLUME	736224.541	4075504.467	0.0
LOCATION	FWN008	VOLUME	736824.541	4075504.467	0.0
LOCATION	FWN009	VOLUME	737024.541	4075504.467	0.0
LOCATION	FWN010	VOLUME	736224.541	4075304.467	0.0
LOCATION	FWN011	VOLUME	736824.541	4075304.467	0.0
LOCATION	FWN012	VOLUME	737024.541	4075304.467	0.0
LOCATION	FWN013	VOLUME	737224.541	4075304.467	0.0
LOCATION	FWN014	VOLUME	736424.541	4075104.467	0.0
LOCATION	FWN015	VOLUME	736824.541	4075104.467	0.0
LOCATION	FWN016	VOLUME	737024.541	4075104.467	0.0
LOCATION	FWN017	VOLUME	737224.541	4075104.467	0.0
LOCATION	FWN018	VOLUME	737424.541	4075104.467	0.0
LOCATION	FWN019	VOLUME	736424.541	4074904.467	0.0
LOCATION	FWN020	VOLUME	737824.541	4074904.467	0.0
LOCATION	FWN021	VOLUME	738224.541	4074904.467	0.0
LOCATION	FWN022	VOLUME	738424.541	4074904.467	0.0
LOCATION	FWN023	VOLUME	738624.541	4074904.467	0.0
LOCATION	FWN024	VOLUME	736224.541	4074704.467	0.0
LOCATION	FWN025	VOLUME	736424.541	4074704.467	0.0
LOCATION	FWN026	VOLUME	737824.541	4074704.467	0.0
LOCATION	FWN027	VOLUME	738024.541	4074704.467	0.0
LOCATION	FWN028	VOLUME	738224.541	4074704.467	0.0
LOCATION	FWN029	VOLUME	738424.541	4074704.467	0.0
LOCATION	FWN030	VOLUME	738624.541	4074704.467	0.0
LOCATION	FWN031	VOLUME	738824.541	4074704.467	0.0
LOCATION	FWN032	VOLUME	736024.541	4074504.467	0.0
LOCATION	FWN033	VOLUME	736224.541	4074504.467	0.0
LOCATION	FWN034	VOLUME	737824.541	4074504.467	0.0
LOCATION	FWN035	VOLUME	738024.541	4074504.467	0.0
LOCATION	FWN036	VOLUME	738224.541	4074504.467	0.0
LOCATION	FWN037	VOLUME	738424.541	4074504.467	0.0
LOCATION	FWN038	VOLUME	735424.541	4074304.467	0.0
LOCATION	FWN039	VOLUME	735424.541	4074104.467	0.0
LOCATION	FWN040	VOLUME	735624.541	4074104.467	0.0
LOCATION	FWN041	VOLUME	735824.541	4074104.467	0.0
LOCATION	FWN042	VOLUME	736024.541	4074104.467	0.0
LOCATION	FWN043	VOLUME	736224.541	4074104.467	0.0
LOCATION	FWN044	VOLUME	736424.541	4074104.467	0.0
LOCATION	FWN045	VOLUME	736624.541	4074104.467	0.0
LOCATION	FWN046	VOLUME	736824.541	4074104.467	0.0
LOCATION	FWN047	VOLUME	737024.541	4074104.467	0.0
LOCATION	FWN048	VOLUME	737224.541	4074104.467	0.0
LOCATION	FWN049	VOLUME	737424.541	4074104.467	0.0
LOCATION	FWN050	VOLUME	737624.541	4074104.467	0.0
LOCATION	FWN051	VOLUME	736224.541	4073904.467	0.0
LOCATION	FWN052	VOLUME	736424.541	4073904.467	0.0

LOCATION	FWN053	VOLUME	736624.541	4073904.467	0.0
LOCATION	FWN054	VOLUME	737424.541	4073904.467	0.0
LOCATION	FWN055	VOLUME	737624.541	4073904.467	0.0
LOCATION	FWN056	VOLUME	737824.541	4073904.467	0.0
LOCATION	FWN057	VOLUME	738024.541	4073904.467	0.0
LOCATION	FWN058	VOLUME	738224.541	4073904.467	0.0
LOCATION	FWN059	VOLUME	737824.541	4073704.467	0.0
LOCATION	FWN060	VOLUME	738024.541	4073704.467	0.0
LOCATION	FWN061	VOLUME	738224.541	4073704.467	0.0
LOCATION	FWN062	VOLUME	738424.541	4073704.467	0.0
LOCATION	FWN063	VOLUME	738624.541	4073704.467	0.0
LOCATION	FWN064	VOLUME	740824.541	4073704.467	0.0
LOCATION	FWN065	VOLUME	741024.541	4073704.467	0.0
LOCATION	FWN066	VOLUME	741224.541	4073704.467	0.0
LOCATION	FWN067	VOLUME	741424.541	4073704.467	0.0
LOCATION	FWN068	VOLUME	738024.541	4073504.467	0.0
LOCATION	FWN069	VOLUME	738224.541	4073504.467	0.0
LOCATION	FWN070	VOLUME	738424.541	4073504.467	0.0
LOCATION	FWN071	VOLUME	738624.541	4073504.467	0.0
LOCATION	FWN072	VOLUME	738824.541	4073504.467	0.0
LOCATION	FWN073	VOLUME	740824.541	4073504.467	0.0
LOCATION	FWN074	VOLUME	741024.541	4073504.467	0.0
LOCATION	FWN075	VOLUME	741224.541	4073504.467	0.0
LOCATION	FWN076	VOLUME	741424.541	4073504.467	0.0
LOCATION	FWN077	VOLUME	741624.541	4073504.467	0.0
LOCATION	FWN078	VOLUME	741824.541	4073504.467	0.0
LOCATION	FWN079	VOLUME	738024.541	4073304.467	0.0
LOCATION	FWN080	VOLUME	738224.541	4073304.467	0.0
LOCATION	FWN081	VOLUME	738424.541	4073304.467	0.0
LOCATION	FWN082	VOLUME	738624.541	4073304.467	0.0
LOCATION	FWN083	VOLUME	738824.541	4073304.467	0.0
LOCATION	FWN084	VOLUME	739024.541	4073304.467	0.0
LOCATION	FWN085	VOLUME	739224.541	4073304.467	0.0
LOCATION	FWN086	VOLUME	739424.541	4073304.467	0.0
LOCATION	FWN087	VOLUME	739624.541	4073304.467	0.0
LOCATION	FWN088	VOLUME	739824.541	4073304.467	0.0
LOCATION	FWN089	VOLUME	740024.541	4073304.467	0.0
LOCATION	FWN090	VOLUME	740224.541	4073304.467	0.0
LOCATION	FWN091	VOLUME	741024.541	4073304.467	0.0
LOCATION	FWN092	VOLUME	741224.541	4073304.467	0.0
LOCATION	FWN093	VOLUME	741424.541	4073304.467	0.0
LOCATION	FWN094	VOLUME	741624.541	4073304.467	0.0
LOCATION	FWN095	VOLUME	741824.541	4073304.467	0.0
LOCATION	FWN096	VOLUME	738824.541	4073104.467	0.0
LOCATION	FWN097	VOLUME	739024.541	4073104.467	0.0
LOCATION	FWN098	VOLUME	739224.541	4073104.467	0.0
LOCATION	FWN099	VOLUME	739424.541	4073104.467	0.0
LOCATION	FWN100	VOLUME	739624.541	4073104.467	0.0
LOCATION	FWN101	VOLUME	739824.541	4073104.467	0.0
LOCATION	FWN102	VOLUME	740024.541	4073104.467	0.0
LOCATION	FWN103	VOLUME	740224.541	4073104.467	0.0
LOCATION	FWN104	VOLUME	741424.541	4073104.467	0.0
LOCATION	FWN105	VOLUME	741624.541	4073104.467	0.0
LOCATION	FWN106	VOLUME	741824.541	4073104.467	0.0

LOCATION FWN107	VOLUME	742024.541	4073104.467	0.0
LOCATION FWN108	VOLUME	742224.541	4073104.467	0.0
LOCATION FWN109	VOLUME	738824.541	4072904.467	0.0
LOCATION FWN110	VOLUME	739024.541	4072904.467	0.0
LOCATION FWN111	VOLUME	739224.541	4072904.467	0.0
LOCATION FWN112	VOLUME	739424.541	4072904.467	0.0
LOCATION FWN113	VOLUME	739624.541	4072904.467	0.0
LOCATION FWN114	VOLUME	739824.541	4072904.467	0.0
LOCATION FWN115	VOLUME	740024.541	4072904.467	0.0
LOCATION FWN116	VOLUME	740224.541	4072904.467	0.0
LOCATION FWN117	VOLUME	742224.541	4072904.467	0.0
LOCATION FWN118	VOLUME	739824.541	4072704.467	0.0
LOCATION FWN119	VOLUME	740024.541	4072704.467	0.0
LOCATION FWN120	VOLUME	740224.541	4072704.467	0.0
LOCATION FWN121	VOLUME	740824.541	4072704.467	0.0
LOCATION FWN122	VOLUME	741024.541	4072704.467	0.0
LOCATION FWN123	VOLUME	741224.541	4072704.467	0.0
LOCATION FWN124	VOLUME	740024.541	4072504.467	0.0
LOCATION FWN125	VOLUME	740224.541	4072504.467	0.0
LOCATION FWN126	VOLUME	740424.541	4072504.467	0.0
LOCATION FWN127	VOLUME	740624.541	4072504.467	0.0
LOCATION FWN128	VOLUME	740824.541	4072504.467	0.0
LOCATION FWN129	VOLUME	741024.541	4072504.467	0.0
LOCATION FWN130	VOLUME	741224.541	4072504.467	0.0
LOCATION FWN131	VOLUME	740024.541	4072304.467	0.0
LOCATION FWN132	VOLUME	740224.541	4072304.467	0.0
LOCATION FWN133	VOLUME	740424.541	4072304.467	0.0
LOCATION FWN134	VOLUME	740624.541	4072304.467	0.0
LOCATION FWN135	VOLUME	740824.541	4072304.467	0.0
LOCATION FWN136	VOLUME	741024.541	4072304.467	0.0
LOCATION FWN137	VOLUME	741224.541	4072304.467	0.0
LOCATION FWN138	VOLUME	741424.541	4071904.467	0.0
LOCATION FWN139	VOLUME	736424.541	4075704.467	0.0
LOCATION FWN140	VOLUME	735824.541	4074504.467	0.0
LOCATION FWN141	VOLUME	741424.541	4073304.467	0.0
LOCATION FWN142	VOLUME	741224.541	4073104.467	0.0
LOCATION FWN143	VOLUME	741424.541	4073104.467	0.0
LOCATION FWN144	VOLUME	741624.541	4073104.467	0.0
LOCATION FWN145	VOLUME	741824.541	4073104.467	0.0
LOCATION FWN146	VOLUME	741224.541	4072904.467	0.0
LOCATION FWN147	VOLUME	741624.541	4072904.467	0.0
LOCATION FWN148	VOLUME	741024.541	4072704.467	0.0
LOCATION FWN149	VOLUME	741224.541	4072704.467	0.0
LOCATION FWN150	VOLUME	741424.541	4072704.467	0.0
LOCATION FWN151	VOLUME	741624.541	4072704.467	0.0
LOCATION FWN152	VOLUME	741424.541	4072504.467	0.0
LOCATION FWN153	VOLUME	741624.541	4072504.467	0.0
LOCATION FWN154	VOLUME	741424.541	4072304.467	0.0
LOCATION FWN155	VOLUME	741424.541	4072104.467	0.0
LOCATION FWN156	VOLUME	741624.541	4072104.467	0.0
LOCATION FWN157	VOLUME	741424.541	4071904.467	0.0
LOCATION FWN158	VOLUME	741624.541	4071904.467	0.0
LOCATION FWN159	VOLUME	736224.541	4075704.467	0.0
LOCATION FWN160	VOLUME	736424.541	4075704.467	0.0

LOCATION FWN161	VOLUME	736624.541	4075704.467	0.0
LOCATION FWN162	VOLUME	736824.541	4075704.467	0.0
LOCATION FWN163	VOLUME	736224.541	4075504.467	0.0
LOCATION FWN164	VOLUME	736424.541	4075504.467	0.0
LOCATION FWN165	VOLUME	736624.541	4075504.467	0.0
LOCATION FWN166	VOLUME	736824.541	4075504.467	0.0
LOCATION FWN167	VOLUME	736224.541	4075304.467	0.0
LOCATION FWN168	VOLUME	736424.541	4075304.467	0.0
LOCATION FWN169	VOLUME	736624.541	4075304.467	0.0
LOCATION FWN170	VOLUME	736824.541	4075304.467	0.0
LOCATION FWN171	VOLUME	736224.541	4075104.467	0.0
LOCATION FWN172	VOLUME	736424.541	4075104.467	0.0
LOCATION FWN173	VOLUME	736624.541	4075104.467	0.0
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LOCATION FWN176	VOLUME	737224.541	4075104.467	0.0
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LOCATION FWN179	VOLUME	737824.541	4075104.467	0.0
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LOCATION FWN187	VOLUME	737824.541	4074904.467	0.0
LOCATION FWN188	VOLUME	736224.541	4074704.467	0.0
LOCATION FWN189	VOLUME	736424.541	4074704.467	0.0
LOCATION FWN190	VOLUME	736624.541	4074704.467	0.0
LOCATION FWN191	VOLUME	736824.541	4074704.467	0.0
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LOCATION FWN196	VOLUME	737824.541	4074704.467	0.0
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LOCATION FWN198	VOLUME	738624.541	4074704.467	0.0
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LOCATION FWN322	VOLUME	741224.541	4073104.467	0.0

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                    FLAG   76     1.80     1.80     1.80     1.80
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                    FLAG   81     1.80     1.80     1.80     1.80
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                    FLAG   81     1.80     1.80
   GRIDCART UCART1 END
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   DISCCART    733752.00   4071015.00    0.00
   DISCCART    733538.00   4070955.00    0.00
   DISCCART    733603.00   4070867.00    0.00
   DISCCART    734294.00   4070090.00    0.00
   DISCCART    734235.00   4071367.00    0.00
   DISCCART    733005.00   4070881.00    0.00
   DISCCART    732939.00   4070783.00    0.00
   DISCCART    733270.00   4071359.00    0.00
   DISCCART    733256.00   4071101.00    0.00
   DISCCART    736165.00   4076646.00    0.00
   DISCCART    736142.00   4076652.00    0.00
   DISCCART    736119.00   4076657.00    0.00
   DISCCART    736101.00   4076662.00    0.00
   DISCCART    736268.00   4076567.00    0.00
   DISCCART    733522.00   4075870.00    0.00
   DISCCART    733503.00   4075810.00    0.00
   DISCCART    733490.00   4075730.00    0.00
   DISCCART    733478.00   4075697.00    0.00
   DISCCART    734427.00   4075111.00    0.00
   DISCCART    743494.00   4075470.00    0.00
   DISCCART    733964.00   4075622.00    0.00
   DISCCART    734243.00   4072940.00    0.00
   DISCCART    734224.00   4072962.00    0.00
   DISCCART    734188.00   4072900.00    0.00
   DISCCART    743177.00   4072824.00    0.00
   DISCCART    734718.00   4073308.00    0.00
   DISCCART    737247.00   4072216.00    0.00
   DISCCART    735610.00   4074256.00    0.00
   DISCCART    735610.00   4074256.00    0.00
   DISCCART    738884.00   4071994.00    0.00
   DISCCART    739812.00   4071686.00    0.00
   DISCCART    739802.00   4072537.00    0.00
   DISCCART    739762.00   4072580.00    0.00
   DISCCART    739738.00   4072804.00    0.00
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   DISCCART    742097.00   4072010.00    0.00
   DISCCART    734441.00   4075063.00    0.00
   DISCCART    734441.00   4075077.00    0.00
   DISCCART    734433.00   4075098.00    0.00
RE FINISHED
**
****************************************
** AERMOD Meteorology Pathway
****************************************
**
**
ME STARTING
** Surface File Path: C:\Lakes\AERMOD View\r2b\flood\Flood\flood\
   SURFFILE Fresno.SFC
** Profile File Path: C:\Lakes\AERMOD View\r2b\flood\Flood\flood\
   PROFFILE Fresno.PFL
   SURFDATA 93193 2005 FRESNO/AIR_TERMINAL
   UAIRDATA 23230 2005 OAKLAND/WSO_AP
   SITEDATA 0 2005
   PROFBASE 101.0 METERS
ME FINISHED
**
****************************************
** AERMOD Output Pathway
****************************************
**
**
OU STARTING
   RECTABLE ALLAVE 1ST
   RECTABLE 1 1ST
** Plotfile Path: C:\Lakes\AERMOD View\r2b\flood\Flood\flood\FLOOD.AD\
   PLOTFILE 1 CNS 1ST FLOOD.AD\CNS_1hr.PLT 31
   PLOTFILE 1 CWB 1ST FLOOD.AD\CWB_1hr.PLT 32
   PLOTFILE 1 FNS 1ST FLOOD.AD\FNS_1hr.PLT 33
   PLOTFILE 1 FWN 1ST FLOOD.AD\FWN_1hr.PLT 34
   PLOTFILE ANNUAL FWN FLOOD.AD\FWN_yr.PLT 35
   PLOTFILE ANNUAL FNS FLOOD.AD\FNS_yr.PLT 36
   PLOTFILE ANNUAL CWB FLOOD.AD\CWB_yr.PLT 37
   PLOTFILE ANNUAL CNS FLOOD.AD\CNS_yr.PLT 38
   NOHEADER PLOTFILE
   FILEFORM EXP
   SUMMFILE flood.sum
OU FINISHED
**
****************************************
** Project Parameters
****************************************
** PROJCTN  CoordinateSystemUTM
** DESCPTN  UTM: Universal Transverse Mercator
** DATUM    North American Datum 1983
** DTMRGN   CONUS
** UNITS    m
** ZONE     10
** ZONEINX  0
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CO STARTING
CO TITLEONE R2B ALL
CO MODELOPT DFAULT CONC
CO AVERTIME 1 ANNUAL
CO FLAGPOLE 1.80
CO RUNORNOT RUN
CO POLLUTID OTHER
CO ERRORFIL "ALL.ERR"
CO FINISHED

SO STARTING
SO LOCATION  Ccanal01  VOLUME  734374.6651  4076370.5082
SO LOCATION  Ccanal02  VOLUME  734424.6651  4076370.5082
SO LOCATION  Ccanal03  VOLUME  734324.6651  4076320.5082
SO LOCATION  Ccanal04  VOLUME  734374.6651  4076320.5082
SO LOCATION  Ccanal05  VOLUME  734424.6651  4076320.5082
SO LOCATION  Ccanal06  VOLUME  734274.6651  4076270.5082
SO LOCATION  Ccanal07  VOLUME  734324.6651  4076270.5082
SO LOCATION  Ccanal08  VOLUME  734374.6651  4076270.5082
SO LOCATION  Ccanal09  VOLUME  734424.6651  4076270.5082
SO LOCATION  Ccanal10  VOLUME  734224.6651  4076220.5082
SO LOCATION  Ccanal11  VOLUME  734274.6651  4076220.5082
SO LOCATION  Ccanal12  VOLUME  734324.6651  4076220.5082
SO LOCATION  Ccanal13  VOLUME  734374.6651  4076220.5082
SO LOCATION  Ccanal14  VOLUME  734224.6651  4076170.5082
SO LOCATION  Ccanal15  VOLUME  734274.6651  4076170.5082
SO LOCATION  Ccanal16  VOLUME  734324.6651  4076170.5082
SO LOCATION  Ccanal17  VOLUME  734374.6651  4076170.5082
SO LOCATION  Ccanal18  VOLUME  734174.6651  4076120.5082
SO LOCATION  Ccanal19  VOLUME  734224.6651  4076120.5082
SO LOCATION  Ccanal20  VOLUME  734274.6651  4076120.5082
SO LOCATION  Ccanal21  VOLUME  734324.6651  4076120.5082
SO LOCATION  Ccanal22  VOLUME  734174.6651  4076070.5082
SO LOCATION  Ccanal23  VOLUME  734224.6651  4076070.5082
SO LOCATION  Ccanal24  VOLUME  734274.6651  4076070.5082
SO LOCATION  Ccanal25  VOLUME  734324.6651  4076070.5082
SO LOCATION  Ccanal26  VOLUME  734174.6651  4076020.5082
SO LOCATION  Ccanal27  VOLUME  734224.6651  4076020.5082
SO LOCATION  Ccanal28  VOLUME  734274.6651  4076020.5082
SO LOCATION  Ccanal29  VOLUME  734324.6651  4076020.5082
SO LOCATION  Ccanal30  VOLUME  734174.6651  4075970.5082
SO LOCATION  Ccanal31  VOLUME  734224.6651  4075970.5082
SO LOCATION  Ccanal32  VOLUME  734274.6651  4075970.5082
SO LOCATION  Ccanal33  VOLUME  734324.6651  4075970.5082
SO LOCATION  Ccanal34  VOLUME  734174.6651  4075920.5082
SO LOCATION  Ccanal35  VOLUME  734224.6651  4075920.5082
SO LOCATION  Ccanal36  VOLUME  734274.6651  4075920.5082
SO LOCATION  Ccanal37  VOLUME  734324.6651  4075920.5082
SO LOCATION  Ccanal38  VOLUME  734374.6651  4075920.5082
SO LOCATION  Ccanal39  VOLUME  734224.6651  4075870.5082
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CO STARTING
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CO POLLUTID OTHER
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CO MODELOPT DFAULT CONC
CO AVERTIME 1 ANNUAL
CO FLAGPOLE 1.80
CO RUNORNOT RUN
CO POLLUTID OTHER
CO ERRORFIL "CHOW.ERR"
CO FINISHED

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CO AVERTIME 1 ANNUAL
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SO SRCPARAM STAGE156 0.00591715976331361 5 23.2558139534884 1.4
SO SRCPARAM STAGE157 0.00591715976331361 5 23.2558139534884 1.4
SO SRCPARAM STAGE158 0.00591715976331361 5 23.2558139534884 1.4
SO SRCPARAM STAGE159 0.00591715976331361 5 23.2558139534884 1.4
SO SRCPARAM STAGE160 0.00591715976331361 5 23.2558139534884 1.4
SO SRCPARAM STAGE161 0.00591715976331361 5 23.2558139534884 1.4
SO SRCPARAM STAGE162 0.00591715976331361 5 23.2558139534884 1.4
SO SRCPARAM STAGE163 0.00591715976331361 5 23.2558139534884 1.4
SO SRCPARAM STAGE164 0.00591715976331361 5 23.2558139534884 1.4
SO SRCPARAM STAGE165 0.00591715976331361 5 23.2558139534884 1.4
SO SRCPARAM STAGE166 0.00591715976331361 5 23.2558139534884 1.4
SO SRCPARAM STAGE167 0.00591715976331361 5 23.2558139534884 1.4
SO SRCPARAM STAGE168 0.00591715976331361 5 23.2558139534884 1.4
SO SRCPARAM STAGE169 0.00591715976331361 5 23.2558139534884 1.4
SO SRCGROUP CCANAL CCANAL01-CCANAL589
SO SRCGROUP STAGE STAGE01-STAGE169
SO FINISHED

RE STARTING
RE GRIDCART UCART1 STA
                   XYINC 732500 104 100.00 4069400 81 100.00
   GRIDCART UCART1 END
RE DISCCART 733694 4071080
RE DISCCART 733752 4071015
RE DISCCART 733538 4070955
RE DISCCART 733603 4070867
RE DISCCART 734294 4070090
RE DISCCART 734235 4071367
RE DISCCART 733005 4070881
RE DISCCART 732939 4070783
RE DISCCART 733270 4071359
RE DISCCART 733256 4071101
RE DISCCART 736165 4076646
RE DISCCART 736142 4076652
RE DISCCART 736119 4076657
RE DISCCART 736101 4076662
RE DISCCART 736268 4076567
RE DISCCART 733522 4075870
RE DISCCART 733503 4075810
RE DISCCART 733490 4075730
RE DISCCART 733478 4075697
RE DISCCART 734427 4075111
RE DISCCART 743494 4075470
```

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RE DISCCART 733964 4075622
RE DISCCART 734243 4072940
RE DISCCART 734224 4072962
RE DISCCART 734188 4072900
RE DISCCART 743177 4072824
RE DISCCART 734718 4073308
RE DISCCART 737247 4072216
RE DISCCART 735610 4074256
RE DISCCART 735610 4074256
RE DISCCART 738884 4071994
RE DISCCART 739812 4071686
RE DISCCART 739802 4072537
RE DISCCART 739762 4072580
RE DISCCART 739738 4072804
RE DISCCART 742097 4072010
RE DISCCART 734441 4075063
RE DISCCART 734441 4075077
RE DISCCART 734433 4075098
RE FINISHED

ME STARTING
   SURFFILE "FRESNO.SFC"
   PROFFILE "Fresno.PFL"
   SURFDATA 93193 2005 FRESNO/AIR_TERMINAL
   UAIRDATA 23230 2005 OAKLAND/WSO_AP
   PROFBASE 101.0 METERS
ME FINISHED

OU STARTING
   RECTABLE ALLAVE FIRST
   PLOTFILE ANNUAL STAGE "STAGE_YR.PLT"
   PLOTFILE 1 STAGE 1ST "STAGE_1HR.PLT"
   SUMMFILE "STAGE.SUM"
OU FINISHED
```

Mendota Pool Bypass and Reach 2B Improvements Project

Appendix 17-A

Draft
Environmental Impact Statement/Report

SAN JOAQUIN RIVER
RESTORATION PROGRAM

Draft
June 2015

CERTIFICATE OF CALIBRATION
17235-1
FOR BRÜEL & KJÆR
HANDHELD ANALYZER

Model **2250** Serial No. **2672071**
ID No. **N/A**
With Microphone **4189** Serial No. **2662748**
With Preamplifier **ZC0032** ID# **10617**
P.O. # **Verbal**

Customer: **URS Corporation**
Santa Ana, CA 92705

was tested and met factory specifications at the points tested
according to the Referenced Test Procedure

on **17 FEB 2010** **BY HAROLD LYNCH**
Service Manager

As received condition: Within Specification.
Re-calibration due on: **17 FEB 2012**

Certified References*

Mfg.	Type	Serial No.	Date Due
B&K	2636	1423390	05 JAN 2011
B&K	1049	1464545	09 JUN 2010
HP	34401A	3146A48348	18 JUN 2010
HP	3458A	2823A07179	23 JUN 2010
B&K	4226	2141942	07 DEC 2010
B&K	4231	1723623	30 JUN 2010

Performed in Compliance with ANSI, NCSL Z-540-1, 1994
and ISO 17025, ISO 9001:2000 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **ACCT Procedure 2250 Ver. 2.0**

Brüel & Kjær Factory Service Instructions: **2250**

Temperature	Relative Humidity	Barometric Pressure
23°C	**32**%	**986.33** hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc..

Signed: **ODIN METROLOGY, INC.**

CALIBRATION OF BRÜEL & KJÆR INSTRUMENTS
3533 OLD CONEJO ROAD; SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

2250/2270 SOFTWARE LICENSE

	BZ7230 ver. 3.x
License/Lizenz/Licence/Licencia/Licenza	0526 9F64 75AF CA02
Serial No./Seriennummer/Numéro de série Nº de Serie/Nr. di serie	2672071

BR1625-11

Brüel & Kjær

MANUFACTURER'S CERTIFICATE OF CONFORMANCE

We certify that Brüel & Kjær -2250--- Serial No 2672071 has been tested and passed all production tests, confirming compliance with the manufacturer's published specification at the date of the test.

The final test has been performed using calibrated equipment, traceable to National or International Standards or by ratio measurements.

Brüel & Kjær is certified under ISO 9001:2000 assuring that all calibration data for test equipment are retained on file and are available for inspection upon request.

Nærum 28-jan-2009

Torben Bjørn
Vice President
Operations

Please note that this document is not a calibration certificate, for information on our calibration services please contact your nearest Brüel & Kjær Service Center.

BA0238-15

WORLD HEADQUARTERS: DK-2850 Nærum · Denmark

Brüel & Kjær

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-151007

Instrument Model CAL200, Serial Number 2794, was calibrated on 02NOV2011. The instrument meets factory specifications per Procedure D0001.8190.

Instrument found to be in calibration as received: YES
Date Calibrated: 02NOV2011
Calibration due: 02NOV2013

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2559	2504	12 Months	29NOV2011	17865-1
PCB	1502B02FJ15PSIA	1342	12 Months	06DEC2011	3374488329
Larson Davis	2900	0661	12 Months	05APR2012	2011-141857
Hewlett Packard	34401A	3146A10352	12 Months	21AUG2012	5335364
Larson Davis	PRM915	0112	12 Months	09SEP2012	2011-148845
Larson Davis	PRM902	0480	12 Months	09SEP2012	2011-148846
Larson Davis	MTS1000/2201	0111	12 Months	09SEP2012	SM090911

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Before: 114.06 dB, 94.05 dB, 1000.1 Hz @ sea level.
After: Refer to Certificate of Measured Output.

Signed: _____
Technician: Scott Montgomery

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-151300

Instrument Model 820, Serial Number 1768, was calibrated on 08NOV2011. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 08NOV2011
Calibration due: 08NOV2013

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2239	0099 / 0104	12 Months	18JAN2012	2011-138645

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 25 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data same as shipped data.
Tested with PRM828-2751

Signed: Ron Harris
Technician: Ron Harris

Page 1 of 1

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2010-131816

Instrument Model 820, Serial Number 1597, was calibrated on 16JUL2010. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 16JUL2010
Calibration due: 16JUL2012

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0277 / 0109	12 Months	24MAR2011	2010-127832

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 33 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"As Received" data is the same as shipped data.
Tested with 828-2491

Signed: Ron Harris
Technician: Ron Harris

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2000 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2010-131844

Instrument Model 820, Serial Number 1470, was calibrated on 19JUL2010. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: YES
Date Calibrated: 19JUL2010
Calibration due: 19JUL2012

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2239	0099 / 0104	12 Months	20JAN2011	2010-125871

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 34 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data same as shipped data.
Tested with 828-917

Signed: Ron Harris

Technician: Ron Harris

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2000 Certified

Mendota Pool Bypass and Reach 2B Improvements Project

Appendix 17-B

Draft
Environmental Impact Statement/Report

SAN JOAQUIN RIVER
RESTORATION PROGRAM

Draft
June 2015

FIELD MEASUREMENT DATA SHEET

URS

Project Name: Reach 2B San Joaquine River Restoration Job # 18600200.0031

ID

SITE IDENTIFICATION: LT 1 OBSERVER(s): Steve Ryan
START DATE & TIME: 12/28/11 9:12 END DATE & TIME: 12/29/11 10:02
ADDRESS: 13208 East side dr.
GPS coordinates: N 36° 48' 22.4" W 120° 20' 59.3

Weather

TEMP: 42 ° F HUMIDITY: 40 % R.H. WIND: CALM LIGHT MODERATE VARIABLE
WINDSPEED: 5 MPH DIR: N NE E SE S SW W NW STEADY GUSTY ____MPH
SKY: CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other: _____

Acoustic Measurements

INSTRUMENT: 820 Blue TYPE: 1 2 SERIAL #: 1768
CALIBRATOR: 200 SERIAL #: 2794
CALIBRATION CHECK: PRE-TEST 94 dBA SPL POST-TEST 94 dBA SPL WINDSCREEN ___
SETTINGS: A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER: _____

Rec #	Start Time / End Time	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
1	9:12 / 10:02	48.9	82.8	26.5	32.4	38.1	46.8	
___	___ / ___							
___	___ / ___							
___	___ / ___							

COMMENTS: mounted to power pole

Source Info and Traffic Counts

PRIMARY NOISE(S): TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER
ROADWAY TYPE: East side dr., Paved, 2 Lane rd., Lots of Potholes
COUNT DURATION: _____-MINUTE

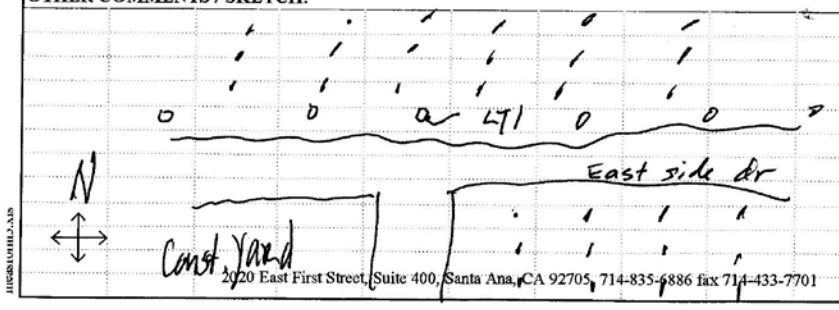
	SPEED (mph) NB / EB / SB / WB	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	___ / ___	___ / ___	___ / ___	___ / ___
MED. TRUCKS:	___ / ___	___ / ___	___ / ___	___ / ___
HVY TRUCKS:	___ / ___	___ / ___	___ / ___	___ / ___
BUSES:	___ / ___	___ / ___	___ / ___	___ / ___
MOTORCYCLES:	___ / ___	___ / ___	___ / ___	___ / ___

SPEED ESTIMATED BY: RADAR / DRIVING / OBSERVER

OTHER NOISE SOURCES: distant AIRCRAFT overhead / RUSTLING LEAVES / distant BARKING DOGS / BIRDS
distant CHILDREN PLAYING / distant TRAFFIC / distant LANDSCAPING / distant TRAINS
OTHER: _____

Description / Sketch

TERRAIN: HARD SOFT MIXED FLAT OTHER: _____
PHOTOS: _____
OTHER COMMENTS / SKETCH:



2020 East First Street, Suite 400, Santa Ana, CA 92705, 714-835-6886 fax 714-433-7701

FIELD MEASUREMENT DATA SHEET

URS **Project Name:** Reach 2B San Joaquine River Restoration **Job #** 18600200.0031

ID

SITE IDENTIFICATION: LT2 OBSERVER(s): Stan, Ryan
START DATE & TIME: 12/28/11 950 END DATE & TIME: 12/28/11 10:16
ADDRESS: Eastside Dr 2382-2398 N. San Mateo Rd.

GPS coordinates: N 36°46'17.8" W 120°18'51.3"

Weather

TEMP: 47 °F HUMIDITY: 63 % R.H. WIND: CALM LIGHT (MODERATE) VARIABLE
WINDSPEED: 6 MPH DIR: N NE (E) SE S SW W NW STEADY GUSTY ____ MPH
SKY: (CLEAR SUNNY) DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other: ____

Acoustic Measurements

INSTRUMENT: 820 Green TYPE: (1) 2 SERIAL #: 1597
CALIBRATOR: 200 SERIAL #: 2794
CALIBRATION CHECK: PRE-TEST 94 dBA SPL POST-TEST 93.8 dBA SPL WINDSCREEN ✓
SETTINGS: (A-WEIGHTED) (SLOW) FAST FRONTAL RANDOM ANSI OTHER: ____

Rec #	Start Time / End Time	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
1	950 / 10:16	55.7	89.9	22.8	27.4	36.3	46	
	/							
	/							
	/							

COMMENTS: Mounted to power pole, 5+ dogs from house

Source Info and Traffic Counts

PRIMARY NOISE(S): (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER
ROADWAY TYPE: San Mateo, dirt/paved, 1 lane Rd.
COUNT DURATION: ____-MINUTE SPEED (mph) #2 COUNT: SPEED (mph)

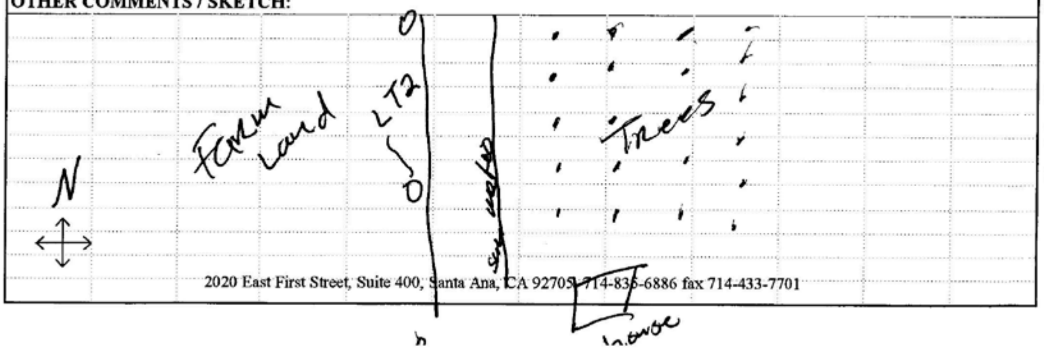
	NB / EB / SB / WB	NB EB / SB WB	NB / EB / SB / WB	NB EB / SB WB
AUTOS:	/	/	/	/
MED. TRUCKS:	/	/	/	/
HVY TRUCKS:	/	/	/	/
BUSES:	/	/	/	/
MOTORCYCLES:	/	/	/	/

SPEED ESTIMATED BY: RADAR / DRIVING / OBSERVER

OTHER NOISE SOURCES: distant AIRCRAFT overhead / RUSTLING LEAVES / distant BARKING DOGS / BIRDS
distant CHILDREN PLAYING / distant TRAFFIC / distant LANDSCAPING / distant TRAINS
OTHER:

Description / Sketch

TERRAIN: HARD (SOFT) MIXED FLAT OTHER:
PHOTOS:
OTHER COMMENTS / SKETCH:



2020 East First Street, Suite 400, Santa Ana, CA 92705 714-835-6886 fax 714-433-7701

FIELD MEASUREMENT DATA SHEET

URS Project Name: Reach 2B San Joaquine River Restoration Job # 18600200.0031

ID

SITE IDENTIFICATION: LT3 OBSERVER(s): Stan, Ryan
START DATE & TIME: 12/28/11 1045 END DATE & TIME: 12/29/11 11:06
ADDRESS:
GPS coordinates: N36°47' 32.6" W120°22' 18.5"

Weather

TEMP: 50.2 F HUMIDITY: 44 % R.H. WIND: CALM LIGHT MODERATE VARIABLE
WINDSPEED: 0-1 MPH DIR: (N) NE E SE S SW W NW STEADY GUSTY ____MPH
SKY: CLEAR SUNNY DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other: _____

Acoustic Measurements

INSTRUMENT: 820 yellow TYPE: (1) 2 SERIAL #: 1470
CALIBRATOR: 200 SERIAL #: 2794
CALIBRATION CHECK: PRE-TEST 94 dBA SPL POST-TEST 93.8 dBA SPL WINDSCREEN ✓
SETTINGS: A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER: _____

Rec #	Start Time	End Time							
1	10:15	11:06	L_{eq} 39.2	L_{max} 115	L_{min} 21.2	L_{90} 26.9	L_{50} 32.3	L_{10} 39.9	
___/___/___			L_{eq} ___	L_{max} ___	L_{min} ___	L_{90} ___	L_{50} ___	L_{10} ___	
___/___/___			L_{eq} ___	L_{max} ___	L_{min} ___	L_{90} ___	L_{50} ___	L_{10} ___	
___/___/___			L_{eq} ___	L_{max} ___	L_{min} ___	L_{90} ___	L_{50} ___	L_{10} ___	

COMMENTS: Marked to dead tree in Creek bed, Barking dogs

Source Info and Traffic Counts

PRIMARY NOISE(S): (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER
ROADWAY TYPE: Paved Rd., Buss Rd, 2 lane Rd.
COUNT DURATION: _____-MINUTE SPEED (mph) #2 COUNT: SPEED (mph)

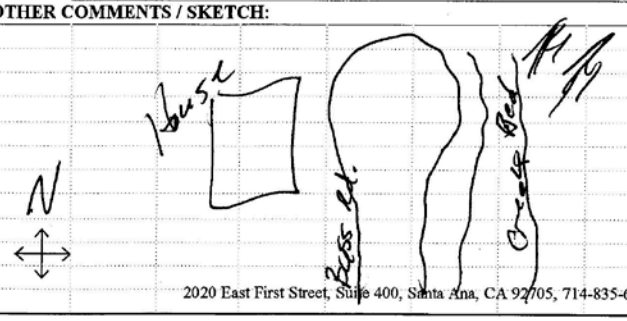
	NB / EB / SB / WB	NB EB / SB WB	NB / EB / SB / WB	NB EB / SB WB
AUTOS:	___/___	___/___	___/___	___/___
MED. TRUCKS:	___/___	___/___	___/___	___/___
HVY TRUCKS:	___/___	___/___	___/___	___/___
BUSES:	___/___	___/___	___/___	___/___
MOTORCYCLES:	___/___	___/___	___/___	___/___

SPEED ESTIMATED BY: RADAR / DRIVING / OBSERVER

OTHER NOISE SOURCES: distant AIRCRAFT overhead / RUSTLING LEAVES / distant BARKING DOGS / BIRDS
distant CHILDREN PLAYING / distant TRAFFIC / distant LANDSCAPING / distant TRAINS
OTHER: _____

Description / Sketch

TERRAIN: HARD (SOFT) MIXED FLAT OTHER: _____
PHOTOS: _____
OTHER COMMENTS / SKETCH:



2020 East First Street, Suite 400, Santa Ana, CA 92705, 714-835-6886 fax 714-433-7701

FIELD MEASUREMENT DATA SHEET

URS Project Name: Reach 2B San Joaquine River Restoration Job # 18600200.0031

ID

SITE IDENTIFICATION: ST1 OBSERVER(s): Ryan, Stan
START DATE & TIME: 12/28/11 10:30 END DATE & TIME:
ADDRESS: Mendota Pool Park
GPS coordinates: N36° 46' 43.6" W120° 22' 23.7"

Weather

TEMP: 54 ° F HUMIDITY: 51.4 % R.H. WIND: CALM (LIGHT) MODERATE VARIABLE
WINDSPEED: 3.5 MPH DIR: N NE E SE (S) SW W NW STEADY GUSTY ____MPH
SKY: (CLEAR) (SUNNY) DARK PARTLY CLOUDY OVRCST FOG DRIZZLE RAIN Other:

Acoustic Measurements

INSTRUMENT: BK 2250 TYPE: (1) 2 SERIAL #: 2672071
CALIBRATOR: 200 SERIAL #: 2794
CALIBRATION CHECK: PRE-TEST 94.1 dBA SPL POST-TEST 94.1 dBA SPL WINDSCREEN X
SETTINGS: (A-WEIGHTED) (SLOW) FAST FRONTAL RANDOM ANSI OTHER:

	Rec #	Start Time / End Time							
Reach 2B001	1	10:30 / 12:30	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
Reach 2B002	2	08:00 / 22:00	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
Reach 2B003	3	22:00 / 06:00	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	
	/	/	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}	

COMMENTS: Mounted to tripod

Source Info and Traffic Counts

PRIMARY NOISE(S): (TRAFFIC) AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER
ROADWAY TYPE: Bass Rd., Paved, 2 Lane Road
COUNT DURATION: ____-MINUTE

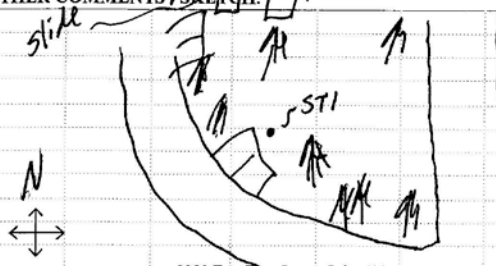
	SPEED (mph) NB EB / SB WB	#2 COUNT: NB / EB / SB / WB	SPEED (mph) NB EB / SB WB
AUTOS:	____ / ____	____ / ____	____ / ____
MED. TRUCKS:	____ / ____	____ / ____	____ / ____
HVY TRUCKS:	____ / ____	____ / ____	____ / ____
BUSES:	____ / ____	____ / ____	____ / ____
MOTORCYCLES:	____ / ____	____ / ____	____ / ____

SPEED ESTIMATED BY: RADAR / DRIVING / OBSERVER

OTHER NOISE SOURCES: distant AIRCRAFT overhead / (RUSTLING LEAVES) / distant BARKING DOGS / (BIRDS)
distant CHILDREN PLAYING / distant TRAFFIC / distant LANDSCAPING / distant TRAINS
OTHER:

Description / Sketch

TERRAIN: (HARD) SOFT MIXED FLAT OTHER:
PHOTOS: dead grass
OTHER COMMENTS / SKETCH:



2020 East First Street, Suite 400, Santa Ana, CA 92705, 714-835-6886 fax 714-433-7701

Mendota Pool Bypass and Reach 2B Improvements Project

Appendix 17-C

Draft
Environmental Impact Statement/Report

SAN JOAQUIN RIVER
RESTORATION PROGRAM

Draft
June 2015

Table C-1: Noise Levels for each Scheduled Construction Activity to the 45 and 50 dBA SPL Contours (feet)

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
2	1	GROUP 1	Levee Construction							
2	2	GROUP 1	Levee Construction	Levee Preparation						
2	3	GROUP 1	Levee Construction	Levee Preparation	Clearing & Grubbing			87	6,126	3,445
2	4	GROUP 1	Levee Construction	Levee Preparation	Tree Removal			87	6,126	3,445
2	5	GROUP 1	Levee Construction	Right Setback Levee						
2	6	GROUP 1	Levee Construction	Right Setback Levee	Compacted Embankment			88	6,698	3,766
2	7	GROUP 1	Levee Construction	Right Setback Levee	Slurry Wall (88 Percent Of Total Levee Length)			87	6,126	3,445
2	8	GROUP 1	Levee Construction	Right Setback Levee	USACE Trench Foundation			88	6,698	3,766
2	9	GROUP 1	Levee Construction	Right Setback Levee	Borrow Excavation (< 1 Mile)			88	6,698	3,766
2	10	GROUP 1	Levee Construction	Left Setback Levee						
2	11	GROUP 1	Levee Construction	Left Setback Levee	Compacted Embankment			88	6,698	3,766
2	12	GROUP 1	Levee Construction	Left Setback Levee	Slurry Wall (88 Percent Of Total Levee Length)			87	6,126	3,445
2	13	GROUP 1	Levee Construction	Left Setback Levee	USACE Trench Foundation			88	6,698	3,766
2	14	GROUP 1	Levee Construction	Left Setback Levee	Borrow Excavation (< 1 Mile)			88	6,698	3,766
2	15	GROUP 1	Levee Construction	General						
2	16	GROUP 1	Levee Construction	General	Seeding (Levee Slopes)			88	6,698	3,766
2	17	GROUP 1	Levee Construction	General	Ramps & Turnabouts			88	6,698	3,766
2	18	GROUP 1	Levee Construction	General	Right Levee Aggregate Base Roadway			88	6,698	3,766
2	19	GROUP 1	Levee Construction	General	Left Levee Aggregate Base Roadway			88	7,063	3,972
2	20	GROUP 1	Levee Construction	General	Haul Excess Material By Truck <20 Miles (Drainage Channel)			88	6,698	3,766
2	21	GROUP 1	Levee Construction	General	Mobilization			80	2,963	1,666
2	46	GROUP 2	Levee Removal							
2	47	GROUP 2	Levee Removal	Haul Excess Material By Truck <20 Miles (Levee Removal)				88	6,698	3,766
2	48	GROUP 2	Levee Removal	Mobilization				80	2,963	1,666
2	136	GROUP 3	Chowchilla Bifurcation Structure							

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
2	137	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank						
2	138	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation					
2	139	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Clearing & Grubbing		87	6,126	3,445
2	140	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Cofferdam		103	38,638	21,728
2	141	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Cofferdam Removal		103	38,638	21,728
2	142	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
2	143	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Dewatering		83	4,029	2,266
2	144	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Excavation To Stockpile		88	6,698	3,766
2	145	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Excavation To Disposal Off Site		88	6,698	3,766
2	146	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Concrete Foundation		83	4,029	2,266
2	147	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure					
2	148	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Concrete		83	4,029	2,266
2	149	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Reinforcing Steel		83	4,029	2,266
2	150	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Steel Grating		83	4,029	2,266
2	151	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate		83	4,029	2,266
2	152	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Adjustable Steel Slot Weir		83	4,029	2,266
2	153	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate For Pipe Diversion		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
2	154	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate For Supplemental Flow Pipe		83	4,029	2,266
2	155	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Fish Screen		83	4,029	2,266
2	156	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Trash Rack		83	4,029	2,266
2	157	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Automated Trash Rack Screen Cleaner		83	4,029	2,266
2	158	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Steel Slide Gate Operator Control		83	4,029	2,266
2	159	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	60" Steel Pipe		83	4,029	2,266
2	160	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	84" Steel Pipe (Two @ 270 LF EA)		84	4,462	2,509
2	161	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River					
2	162	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River	Excavate & Fill Bore Pit (30' x 30' x 22' Deep)		83	4,029	2,266
2	163	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River	Bore & Jack (Dual 114" Steel Casing Pipes - 250 LF EA)		86	5,460	3,070
2	164	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River	84" Steel Carrier Pipe (Two @ 260 LF EA)		84	4,462	2,509
2	165	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River	Excavate & Fill Receiving pit (30' x 30' x 22' Deep)		83	4,029	2,266
2	166	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River	Pressure Grout Annular Space		82	3,619	2,035
2	167	GROUP 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River	Mobilization		80	2,963	1,666
2	107	GROUP 4	San Mateo Retrofit							
2	108	GROUP 4	San Mateo Retrofit	Site Preparation & Construction						
2	109	GROUP 4	San Mateo Retrofit	Site Preparation & Construction	Tree Removal			87	6,126	3,445
2	110	GROUP 4	San Mateo Retrofit	Site Preparation & Construction	Clearing & Grubbing			87	6,126	3,445
2	111	GROUP 4	San Mateo Retrofit	Site Preparation & Construction	Demolition (Existing Culvert)			87	6,126	3,445

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
2	112	GROUP 4	San Mateo Retrofit	Site Preparation & Construction	Concrete Box Culverts (5.9' x 24' @ 26' EA)			88	6,698	3,766
2	113	GROUP 4	San Mateo Retrofit	Site Preparation & Construction	Structure Concrete			83	4,029	2,266
2	114	GROUP 4	San Mateo Retrofit	Site Preparation & Construction	Riprap Approaches - Labor			83	4,029	2,266
2	115	GROUP 4	San Mateo Retrofit	Site Preparation & Construction	Site Excavation			88	6,698	3,766
2	116	GROUP 4	San Mateo Retrofit	Site Preparation & Construction	Site Fill			88	6,698	3,766
2	117	GROUP 4	San Mateo Retrofit	Site Preparation & Construction	Embankment Earthwork Fill			88	6,698	3,766
2	118	GROUP 4	San Mateo Retrofit	Site Preparation & Construction	Access Gates			83	4,029	2,266
2	119	GROUP 4	San Mateo Retrofit	Site Preparation & Construction	Dust Control			79	2,376	1,336
2	120	GROUP 4	San Mateo Retrofit	Site Preparation & Construction	SWPPP (Storm Water Permit) Report Preparation			82	3,529	1,984
2	121	GROUP 4	San Mateo Retrofit	Site Preparation & Construction	Worker Protection			100	27,367	15,390
2	122	GROUP 4	San Mateo Retrofit	Temporary Bypass Channel						
2	123	GROUP 4	San Mateo Retrofit	Temporary Bypass Channel	Coffer Dams			100	27,503	15,466
2	124	GROUP 4	San Mateo Retrofit	Temporary Bypass Channel	Dewatering (Upstream & Downstream)			86	5,593	3,145
2	125	GROUP 4	San Mateo Retrofit	Temporary Bypass Channel	Channel Excavation			88	6,698	3,766
2	126	GROUP 4	San Mateo Retrofit	Temporary Bypass Channel	Railcar Bridge (Including Labor)			85	5,113	2,875
2	127	GROUP 4	San Mateo Retrofit	Temporary Bypass Channel	Mobilization			82	3,529	1,984
2	128	GROUP 5	Lone Willow Slough Fish Screen							
2	129	GROUP 5	Lone Willow Slough Fish Screen	Fish Screen Structure						
2	130	GROUP 5	Lone Willow Slough Fish Screen	Fish Screen Structure	Concrete			83	4,029	2,266
2	131	GROUP 5	Lone Willow Slough Fish Screen	Fish Screen Structure	Reinforcing Steel			83	4,029	2,266
2	132	GROUP 5	Lone Willow Slough Fish Screen	Fish Screen Structure	Fish Screen			83	4,029	2,266
2	133	GROUP 5	Lone Willow Slough Fish Screen	Fish Screen Structure	Trash Rack			83	4,029	2,266
2	134	GROUP 5	Lone Willow Slough Fish Screen	Fish Screen Structure	Automated Trash Rack Screen Cleaner			82	3,544	1,993
2	135	GROUP 5	Lone Willow Slough Fish Screen	Fish Screen Structure	Mobilization			85	5,244	2,949
2	74	GROUP 6	Relocation/Modifications							

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
2	75	GROUP 6	Relocation/Modifications	Canal						
2	76	GROUP 6	Relocation/Modifications	Canal	Canal Relocations			85	5,113	2,875
2	77	GROUP 6	Relocation/Modifications	Canal	Mobilization			82	3,529	1,984
2	78	GROUP 6	Relocation/Modifications	Utilities						
2	79	GROUP 6	Relocation/Modifications	Utilities	Overhead Electrical Distribution Removal & Replacement			82	3,544	1,993
2	80	GROUP 6	Relocation/Modifications	Utilities	Mobilization			85	5,244	2,949
2	81	GROUP 6	Relocation/Modifications	Pump Station (quantities below reflect 5 pump stations each location)						
2	82	GROUP 6	Relocation/Modifications	Pump Station (quantities below reflect 5 pump stations each location)	Site Preparation					
2	83	GROUP 6	Relocation/Modifications	Pump Station (quantities below reflect 5 pump stations each location)	Site Preparation	Clearing & Grubbing		87	6,126	3,445
2	84	GROUP 6	Relocation/Modifications	Pump Station (quantities below reflect 5 pump stations each location)	Site Preparation	Canal/Drain Relocation		86	5,460	3,070
2	85	GROUP 6	Relocation/Modifications	Pump Station (quantities below reflect 5 pump stations each location)	Site Preparation	Concrete Lining (Intake & Outfall)		83	4,029	2,266
2	86	GROUP 6	Relocation/Modifications	Pump Station (quantities below reflect 5 pump stations each location)	Site Preparation	Rock Riprap At Outfall		83	4,029	2,266
2	87	GROUP 6	Relocation/Modifications	Pump Station (quantities below reflect 5 pump stations each location)	Site Preparation	Pump & Sump Relocation		82	3,544	1,993
2	88	GROUP 6	Relocation/Modifications	Pump Station (quantities below reflect 5 pump stations each location)	Site Preparation	Replace Electrical Panel		81	3,070	1,727
2	89	GROUP 6	Relocation/Modifications	Pump Station (quantities below reflect 5 pump stations each location)	Site Preparation	PG&E Electrical Service		82	3,619	2,035
2	90	GROUP 6	Relocation/Modifications	Pump Station (quantities below reflect 5 pump stations each location)	Site Preparation	12"Steel Pipe		81	3,070	1,727
2	91	GROUP 6	Relocation/Modifications	Pump Station (quantities below reflect 5 pump stations	Site Preparation	Dust Control		82	3,529	1,984

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
				each location)						
2	92	GROUP 6	Relocation/Modifications	Pump Station (quantities below reflect 5 pump stations each location)	Site Preparation	Worker Protection		80	2,963	1,666
2	93	GROUP 6	Relocation/Modifications	Pump Station (quantities below reflect 5 pump stations each location)	Site Preparation	Mobilization		85	5,244	2,949
2	94	GROUP 6	Relocation/Modifications	Deep Well Floodproofing (quantities below reflect 19 wells each location)						
2	95	GROUP 6	Relocation/Modifications	Deep Well Floodproofing (quantities below reflect 19 wells each location)	Site Preparation & Construction					
2	96	GROUP 6	Relocation/Modifications	Deep Well Floodproofing (quantities below reflect 19 wells each location)	Site Preparation & Construction	Clearing & Grubbing		87	6,126	3,445
2	97	GROUP 6	Relocation/Modifications	Deep Well Floodproofing (quantities below reflect 19 wells each location)	Site Preparation & Construction	Earthwork (Using Loader & Truck)		88	6,698	3,766
2	98	GROUP 6	Relocation/Modifications	Deep Well Floodproofing (quantities below reflect 19 wells each location)	Site Preparation & Construction	Revegetation		86	5,460	3,070
2	99	GROUP 6	Relocation/Modifications	Deep Well Floodproofing (quantities below reflect 19 wells each location)	Site Preparation & Construction	Pull Pump & Column & Reinstall After Modifications		83	4,029	2,266
2	100	GROUP 6	Relocation/Modifications	Deep Well Floodproofing (quantities below reflect 19 wells each location)	Site Preparation & Construction	Column Extension		83	4,029	2,266
2	101	GROUP 6	Relocation/Modifications	Deep Well Floodproofing (quantities below reflect 19 wells each location)	Site Preparation & Construction	Casing Extension		83	4,029	2,266
2	102	GROUP 6	Relocation/Modifications	Deep Well Floodproofing (quantities below reflect 19 wells each location)	Site Preparation & Construction	Discharge Piping Modifications		82	3,544	1,993

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
2	103	GROUP 6	Relocation/Modifications	Deep Well Floodproofing (quantities below reflect 19 wells each location)	Site Preparation & Construction	Replace Electrical Panel		79	2,509	1,411
2	105	GROUP 6	Relocation/Modifications	Deep Well Floodproofing (quantities below reflect 19 wells each location)	Site Preparation & Construction	Dust Control		80	2,963	1,666
2	106	GROUP 6	Relocation/Modifications	Deep Well Floodproofing (quantities below reflect 19 wells each location)	Site Preparation & Construction	Mobilization		85	5,244	2,949
2	22	GROUP 7	Bend 10 Revetment							
2	23	GROUP 7	Bend 10 Revetment	Site Preparation						
2	24	GROUP 7	Bend 10 Revetment	Site Preparation	Clearing & Grubbing (Levee Preparation)			87	6,126	3,445
2	25	GROUP 7	Bend 10 Revetment	Right Setback Levee (Bend 10 Only)						
2	26	GROUP 7	Bend 10 Revetment	Right Setback Levee (Bend 10 Only)	Compacted Embankment			88	6,698	3,766
2	27	GROUP 7	Bend 10 Revetment	Right Setback Levee (Bend 10 Only)	Slurry Wall (100 Percent Of Total Levee Length)			87	6,126	3,445
2	28	GROUP 7	Bend 10 Revetment	Right Setback Levee (Bend 10 Only)	USACE Trench Foundation			88	6,698	3,766
2	29	GROUP 7	Bend 10 Revetment	Right Setback Levee (Bend 10 Only)	Borrow Excavation (< 1 Mile)			88	6,698	3,766
2	30	GROUP 7	Bend 10 Revetment	General						
2	31	GROUP 7	Bend 10 Revetment	General	Seeding (Levee Slopes)			88	6,698	3,766
2	32	GROUP 7	Bend 10 Revetment	General	Ramps & Turnabouts			88	6,698	3,766
2	33	GROUP 7	Bend 10 Revetment	General	Right Levee Aggregate Base Roadway			88	6,698	3,766
2	34	GROUP 7	Bend 10 Revetment	Revetment (Bend 10) Per Linear Foot						
2	44	GROUP 7	Bend 10 Revetment	Revetment (Bend 10) Per Linear Foot	Revetment (Bend 10) Subtotal Per Linear Foot (Subtotal 35 To 43)			84	4,337	2,439
2	45	GROUP 7	Bend 10 Revetment	Revetment (Bend 10) Per Linear Foot	Mobilization			80	2,963	1,666
2	49	GROUP 8	Vegetation & Irrigation							
2	50	GROUP 8	Vegetation & Irrigation	General Description						
2	51	GROUP 8	Vegetation & Irrigation	General Description	Plant Establishment (12 Months)			81	3,070	1,727
2	52	GROUP 8	Vegetation & Irrigation	General Description	Landscape Maintenance (12 Months Or As Needed)			86	5,305	2,983

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
2	53	GROUP 8	Vegetation & Irrigation	General Description	Agricultural Topsoil (6" Layer)			85	5,113	2,875
2	54	GROUP 8	Vegetation & Irrigation	General Description	Erosion Control Fabric			80	2,963	1,666
2	55	GROUP 8	Vegetation & Irrigation	General Description	Irrigation System			81	3,070	1,727
2	56	GROUP 8	Vegetation & Irrigation	General Description	Beaver Fence			85	5,244	2,949
2	57	GROUP 8	Vegetation & Irrigation	General Description	Seeding			85	5,113	2,875
2	58	GROUP 8	Vegetation & Irrigation	General Description	Pole Cuttings			80	2,963	1,666
2	59	GROUP 8	Vegetation & Irrigation	General Description	Fascine Bundle			80	2,963	1,666
2	60	GROUP 8	Vegetation & Irrigation	General Description	Instream Woody Material			80	2,963	1,666
2	61	GROUP 8	Vegetation & Irrigation	General Description	Treepot Installation T8 - Fcf			81	3,070	1,727
2	62	GROUP 8	Vegetation & Irrigation	General Description	Treepot Installation T8 - Oag			81	3,070	1,727
2	63	GROUP 8	Vegetation & Irrigation	General Description	Treepot Installation T4 - Bbt			81	3,070	1,727
2	64	GROUP 8	Vegetation & Irrigation	General Description	Treepot Installation T4 - Cbm			81	3,070	1,727
2	65	GROUP 8	Vegetation & Irrigation	General Description	Treepot Installation DP - Cmb			81	3,070	1,727
2	66	GROUP 8	Vegetation & Irrigation	General Description	Treepot Installation DP - Crg			81	3,070	1,727
2	67	GROUP 8	Vegetation & Irrigation	General Description	Treepot Installation DP - Rbh			81	3,070	1,727
2	68	GROUP 8	Vegetation & Irrigation	General Description	Treepot Installation DP - Sgf			81	3,070	1,727
2	69	GROUP 8	Vegetation & Irrigation	General Description	Treepot Installation DP - Fcf			81	3,070	1,727
2	70	GROUP 8	Vegetation & Irrigation	General Description	Treepot Installation DP - Oag			81	3,070	1,727
2	71	GROUP 8	Vegetation & Irrigation	General Description	Treepot Installation D6 - Swt			81	3,070	1,727
2	72	GROUP 8	Vegetation & Irrigation	General Description	Treepot Installation D6 - Bwt			81	3,070	1,727
2	73	GROUP 8	Vegetation & Irrigation	General Description	Mobilization			75	1,581	889
4	1	Group 1	Levee Construction							
4	2	Group 1	Levee Construction	Levee Preparation						
4	3	Group 1	Levee Construction	Levee Preparation	Clearing & Grubbing			87	6,126	3,445
4	4	Group 1	Levee Construction	Levee Preparation	Tree Removal			87	6,126	3,445
4	5	Group 1	Levee Construction	Right Setback Levee						
4	6	Group 1	Levee Construction	Right Setback Levee	Compacted Embankment			88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
4	7	Group 1	Levee Construction	Right Setback Levee	Slurry Wall (76 Percent Of Total Levee Length)			87	6,126	3,445
4	8	Group 1	Levee Construction	Right Setback Levee	USACE Trench Foundation			88	6,698	3,766
4	9	Group 1	Levee Construction	Right Setback Levee	Borrow Excavation (< 1 Mile)			88	6,698	3,766
4	10	Group 1	Levee Construction	Left Setback Levee						
4	11	Group 1	Levee Construction	Left Setback Levee	Compacted Embankment			88	6,698	3,766
4	12	Group 1	Levee Construction	Left Setback Levee	Slurry Wall (76 Percent Of Total Levee Length)			87	6,126	3,445
4	13	Group 1	Levee Construction	Left Setback Levee	USACE Trench Foundation			88	6,698	3,766
4	14	Group 1	Levee Construction	Left Setback Levee	Borrow Excavation (< 1 Mile)			88	6,698	3,766
4	15	Group 1	Levee Construction	General						
4	16	Group 1	Levee Construction	General	Seeding (Levee Slopes)			88	6,698	3,766
4	17	Group 1	Levee Construction	General	Ramps & Turnabouts					
4	18	Group 1	Levee Construction	General	Right Levee Aggregate Base Roadway			88	6,698	3,766
4	19	Group 1	Levee Construction	General	Left Levee Aggregate Base Roadway			88	6,698	3,766
4	20	Group 1	Levee Construction	General	Haul Excess Material By Truck <20 Miles (Drainage Channel)			88	6,698	3,766
4	21	Group 1	Levee Construction	General	Mobilization			80	2,963	1,666
4	46	Group 2	Levee Removal							
4	47	Group 2	Levee Removal	Haul Excess Material By Truck <20 Miles (Levee Removal)				88	6,698	3,766
4	48	Group 2	Levee Removal	Mobilization				80	2,963	1,666
4	136	Group 3	Chowchilla Bifurcation Structure							
4	137	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank						
4	138	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation					
4	139	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Clearing & Grubbing		87	6,126	3,445
4	140	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Cofferdam		103	38,638	21,728

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
4	141	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Cofferdam Removal		103	38,638	21,728
4	142	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
4	143	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Dewatering		83	4,029	2,266
4	144	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Excavation To Stockpile		88	6,698	3,766
4	145	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Excavation To Disposal Off Site		88	6,698	3,766
4	146	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder Preparation	Concrete Foundation		83	4,029	2,266
4	147	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure					
4	148	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Concrete		83	4,029	2,266
4	149	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Reinforcing Steel		83	4,029	2,266
4	150	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Steel Grating		83	4,029	2,266
4	151	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate		83	4,029	2,266
4	152	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Adjustable Steel Slot Weir		83	4,029	2,266
4	153	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate For Pipe Diversion		83	4,029	2,266
4	154	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate For Supplemental Flow Pipe		83	4,029	2,266
4	155	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Fish Screen		83	4,029	2,266
4	156	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Trash Rack		83	4,029	2,266
4	157	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Automated Trash Rack Screen Cleaner		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
4	158	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	Steel Slide Gate Operator Control		83	4,029	2,266
4	159	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	60" Steel Pipe		83	4,029	2,266
4	160	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Fish Ladder & Supplemental Intake Structure	84" Steel Pipe (Two @ 270 LF EA)		84	4,462	2,509
4	161	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River					
4	162	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River	Excavate & Fill Bore Pit (30' x 30' x 22' Deep)		83	4,029	2,266
4	163	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River	Bore & Jack (Dual 114" Steel Casing Pipes - 250 LF EA)		86	5,460	3,070
4	164	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River	84" Steel Carrier Pipe (Two @ 260 LF EA)		84	4,462	2,509
4	165	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River	Excavate & Fill Receiving pit (30' x 30' x 22' Deep)		83	4,029	2,266
4	166	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River	Pressure Grout Annular Space		82	3,619	2,035
4	167	Group 3	Chowchilla Bifurcation Structure	Fish Ladder With Supplemental Flow - Right Bank	Pipe Installation Beneath River	Mobilization		80	2,963	1,666
4	107	Group 4	San Mateo Retrofit							
4	108	Group 4	San Mateo Retrofit	Site Preparation & Construction						
4	109	Group 4	San Mateo Retrofit	Site Preparation & Construction	Tree Removal			87	6,126	3,445
4	110	Group 4	San Mateo Retrofit	Site Preparation & Construction	Clearing & Grubbing			87	6,126	3,445
4	111	Group 4	San Mateo Retrofit	Site Preparation & Construction	Demolition (Existing Culvert)			87	6,126	3,445
4	112	Group 4	San Mateo Retrofit	Site Preparation & Construction	Concrete Box Culverts (5.9' x 24' @ 26' EA)			88	6,698	3,766
4	113	Group 4	San Mateo Retrofit	Site Preparation & Construction	Structure Concrete			83	4,029	2,266
4	114	Group 4	San Mateo Retrofit	Site Preparation & Construction	Riprap Approaches - Labor			83	4,029	2,266
4	115	Group 4	San Mateo Retrofit	Site Preparation & Construction	Site Excavation			88	6,698	3,766
4	116	Group 4	San Mateo Retrofit	Site Preparation & Construction	Site Fill			88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
4	117	Group 4	San Mateo Retrofit	Site Preparation & Construction	Embankment Earthwork Fill			88	6,698	3,766
4	118	Group 4	San Mateo Retrofit	Site Preparation & Construction	Access Gates			83	4,029	2,266
4	119	Group 4	San Mateo Retrofit	Site Preparation & Construction	Dust Control			79	2,376	1,336
4	120	Group 4	San Mateo Retrofit	Site Preparation & Construction	SWPPP (Storm Water Permit) Report Preparation			75	1,581	889
4	121	Group 4	San Mateo Retrofit	Site Preparation & Construction	Worker Protection			82	3,529	1,984
4	122	Group 4	San Mateo Retrofit	Temporary Bypass Channel						
4	123	Group 4	San Mateo Retrofit	Temporary Bypass Channel	Coffer Dams			103	38,638	21,728
4	124	Group 4	San Mateo Retrofit	Temporary Bypass Channel	Dewatering (Upstream & Downstream)			83	4,029	2,266
4	125	Group 4	San Mateo Retrofit	Temporary Bypass Channel	Channel Excavation			88	6,698	3,766
4	126	Group 4	San Mateo Retrofit	Temporary Bypass Channel	Railcar Bridge (Including Labor)			88	6,698	3,766
4	127	Group 4	San Mateo Retrofit	Temporary Bypass Channel	Mobilization			80	2,963	1,666
4	128	Group 5	Lone Willow Slough Fish Screen							
4	129	Group 5	Lone Willow Slough Fish Screen	Fish Screen Structure						
4	130	Group 5	Lone Willow Slough Fish Screen	Fish Screen Structure	Concrete			83	4,029	2,266
4	131	Group 5	Lone Willow Slough Fish Screen	Fish Screen Structure	Reinforcing Steel			83	4,029	2,266
4	132	Group 5	Lone Willow Slough Fish Screen	Fish Screen Structure	Fish Screen			83	4,029	2,266
4	133	Group 5	Lone Willow Slough Fish Screen	Fish Screen Structure	Trash Rack			83	4,029	2,266
4	134	Group 5	Lone Willow Slough Fish Screen	Fish Screen Structure	Automated Trash Rack Screen Cleaner			83	4,029	2,266
4	135	Group 5	Lone Willow Slough Fish Screen	Fish Screen Structure	Mobilization			80	2,963	1,666
4	74	Group 6	Relocation/Modifications							
4	75	Group 6	Relocation/Modifications	Canal						
4	76	Group 6	Relocation/Modifications	Canal	Canal Relocations			88	6,698	3,766
4	77	Group 6	Relocation/Modifications	Canal	Mobilization			80	2,963	1,666
4	78	Group 6	Relocation/Modifications	Utilities						

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
4	79	Group 6	Relocation/Modifications	Utilities	Overhead Electrical Distribution Removal & Replacement			83	4,029	2,266
4	80	Group 6	Relocation/Modifications	Utilities	Mobilization			80	2,963	1,666
4	81	Group 6	Relocation/Modifications	Pump Station (Quantities Reflect 6 Pump Stations)						
4	82	Group 6	Relocation/Modifications	Pump Station (Quantities Reflect 6 Pump Stations)	Site Preparation					
4	83	Group 6	Relocation/Modifications	Pump Station (Quantities Reflect 6 Pump Stations)	Site Preparation	Clearing & Grubbing		87	6,126	3,445
4	84	Group 6	Relocation/Modifications	Pump Station (Quantities Reflect 6 Pump Stations)	Site Preparation	Canal/Drain Relocation		88	6,698	3,766
4	85	Group 6	Relocation/Modifications	Pump Station (Quantities Reflect 6 Pump Stations)	Site Preparation	Concrete Lining (Intake & Outfall)		83	4,029	2,266
4	86	Group 6	Relocation/Modifications	Pump Station (Quantities Reflect 6 Pump Stations)	Site Preparation	Rock Riprap At Outfall		83	4,029	2,266
4	87	Group 6	Relocation/Modifications	Pump Station (Quantities Reflect 6 Pump Stations)	Site Preparation	Pump & Sump Relocation		83	4,029	2,266
4	88	Group 6	Relocation/Modifications	Pump Station (Quantities Reflect 6 Pump Stations)	Site Preparation	Replace Electrical Panel		81	3,070	1,727
4	89	Group 6	Relocation/Modifications	Pump Station (Quantities Reflect 6 Pump Stations)	Site Preparation	PG&E Electrical Service		81	3,070	1,727
4	90	Group 6	Relocation/Modifications	Pump Station (Quantities Reflect 6 Pump Stations)	Site Preparation	12"Steel Pipe		83	4,029	2,266
4	91	Group 6	Relocation/Modifications	Pump Station (Quantities Reflect 6 Pump Stations)	Site Preparation	Dust Control		79	2,376	1,336
4	92	Group 6	Relocation/Modifications	Pump Station (Quantities Reflect 6 Pump Stations)	Site Preparation	Worker Protection		82	3,529	1,984
4	93	Group 6	Relocation/Modifications	Pump Station (Quantities Reflect 6 Pump Stations)	Site Preparation	Mobilization		80	2,963	1,666
4	94	Group 6	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 27 Wells)						

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
4	95	Group 6	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 27 Wells)	Site Preparation & Construction					
4	96	Group 6	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 27 Wells)	Site Preparation & Construction	Clearing & Grubbing		87	6,126	3,445
4	97	Group 6	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 27 Wells)	Site Preparation & Construction	Earthwork (Using Loader & Truck)		88	6,698	3,766
4	98	Group 6	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 27 Wells)	Site Preparation & Construction	Revegetation		88	6,698	3,766
4	99	Group 6	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 27 Wells)	Site Preparation & Construction	Pull Pump & Column & Reinstall After Modifications		83	4,029	2,266
4	100	Group 6	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 27 Wells)	Site Preparation & Construction	Column Extension		83	4,029	2,266
4	101	Group 6	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 27 Wells)	Site Preparation & Construction	Casing Extension		83	4,029	2,266
4	102	Group 6	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 27 Wells)	Site Preparation & Construction	Discharge Piping Modifications		83	4,029	2,266
4	103	Group 6	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 27 Wells)	Site Preparation & Construction	Replace Electrical Panel		81	3,070	1,727
4	104	Group 6	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 27 Wells)	Site Preparation & Construction	PG&E Electrical Service		81	3,070	1,727
4	105	Group 6	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 27 Wells)	Site Preparation & Construction	Dust Control		79	2,376	1,336
4	106	Group 6	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 27 Wells)	Site Preparation & Construction	Mobilization		80	2,963	1,666
4	22	Group 7	Bend 10 Revetment							
4	23	Group 7	Bend 10 Revetment	Site Preparation						

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
4	24	Group 7	Bend 10 Revetment	Site Preparation	Clearing & Grubbing (Levee Preparation)			87	6,126	3,445
4	25	Group 7	Bend 10 Revetment	Right Setback Levee (Bend 10 Only)						
4	26	Group 7	Bend 10 Revetment	Right Setback Levee (Bend 10 Only)	Compacted Embankment			88	6,698	3,766
4	27	Group 7	Bend 10 Revetment	Right Setback Levee (Bend 10 Only)	Slurry Wall (100 Percent Of Total Levee Length)			87	6,126	3,445
4	28	Group 7	Bend 10 Revetment	Right Setback Levee (Bend 10 Only)	USACE Trench Foundation			88	6,698	3,766
4	29	Group 7	Bend 10 Revetment	Right Setback Levee (Bend 10 Only)	Borrow Excavation (< 1 Mile)			88	6,698	3,766
4	30	Group 7	Bend 10 Revetment	General						
4	31	Group 7	Bend 10 Revetment	General	Seeding (Levee Slopes)			88	6,698	3,766
4	32	Group 7	Bend 10 Revetment	General	Ramps & Turnabouts			88	6,698	3,766
4	33	Group 7	Bend 10 Revetment	General	Right Levee Aggregate Base Roadway			88	6,698	3,766
4	34	Group 7	Bend 10 Revetment	Revetment (Bend 10) Per Linear Foot						
4	44	Group 7	Bend 10 Revetment	Revetment (Bend 10) Per Linear Foot	Revetment (Bend 10) Subtotal Per Linear Foot (Subtotal 35 To 43)			87	6,126	3,445
4	45	Group 7	Bend 10 Revetment	Revetment (Bend 10) Per Linear Foot	Mobilization			80	2,963	1,666
4	49	Group 8	Vegetation & Irrigation							
4	50	Group 8	Vegetation & Irrigation	General Description						
4	51	Group 8	Vegetation & Irrigation	General Description	Plant Establishment (12 Months)			81	3,070	1,727
4	52	Group 8	Vegetation & Irrigation	General Description	Landscape Maintenance (12 Months Or As Needed)			81	3,070	1,727
4	53	Group 8	Vegetation & Irrigation	General Description	Agricultural Topsoil (6" Layer)			88	6,698	3,766
4	54	Group 8	Vegetation & Irrigation	General Description	Erosion Control Fabric			80	2,963	1,666
4	55	Group 8	Vegetation & Irrigation	General Description	Irrigation System			81	3,070	1,727
4	56	Group 8	Vegetation & Irrigation	General Description	Beaver Fence			80	2,963	1,666
4	57	Group 8	Vegetation & Irrigation	General Description	Seeding			88	6,698	3,766
4	58	Group 8	Vegetation & Irrigation	General Description	Pole Cuttings			80	2,963	1,666
4	59	Group 8	Vegetation & Irrigation	General Description	Fascine Bundle			80	2,963	1,666
4	60	Group 8	Vegetation & Irrigation	General Description	Instream Woody Material			80	2,963	1,666

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
4	61	Group 8	Vegetation & Irrigation	General Description	Treepot Installation T8 - Fcf			81	3,070	1,727
4	62	Group 8	Vegetation & Irrigation	General Description	Treepot Installation T8 - Oag			81	3,070	1,727
4	63	Group 8	Vegetation & Irrigation	General Description	Treepot Installation T4 - Bbt			81	3,070	1,727
4	64	Group 8	Vegetation & Irrigation	General Description	Treepot Installation T4 - Cbm			81	3,070	1,727
4	65	Group 8	Vegetation & Irrigation	General Description	Treepot Installation DP - Cmb			81	3,070	1,727
4	66	Group 8	Vegetation & Irrigation	General Description	Treepot Installation DP - Crg			81	3,070	1,727
4	67	Group 8	Vegetation & Irrigation	General Description	Treepot Installation DP - Rbh			81	3,070	1,727
4	68	Group 8	Vegetation & Irrigation	General Description	Treepot Installation DP - Sgf			81	3,070	1,727
4	69	Group 8	Vegetation & Irrigation	General Description	Treepot Installation DP - Fcf			81	3,070	1,727
4	70	Group 8	Vegetation & Irrigation	General Description	Treepot Installation DP - Oag			81	3,070	1,727
4	71	Group 8	Vegetation & Irrigation	General Description	Treepot Installation D6 - Swt			81	3,070	1,727
4	72	Group 8	Vegetation & Irrigation	General Description	Treepot Installation D6 - Bwt			81	3,070	1,727
4	73	Group 8	Vegetation & Irrigation	General Description	Mobilization			80	2,963	1,666
7	1	GROUP 1	MPB Channel							
7	2	GROUP 1	MPB Channel	Bypass Channel						
7	3	GROUP 1	MPB Channel	Bypass Channel	General					
7	4	GROUP 1	MPB Channel	Bypass Channel	General	Clearing & Grubbing		87	6,126	3,445
7	5	GROUP 1	MPB Channel	Bypass Channel	General	Water For Dust Abatement		79	2,376	1,336
7	6	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation					
7	7	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Course Channel Excavation (Scraper) & Local Haul		88	6,698	3,766
7	8	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Course Channel Excavation (Loader & Dozer)		88	6,698	3,766
7	9	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Fine Channel Excavation & Shaping (Excavator)		84	4,462	2,509
7	10	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Haul Off Site (<20 Miles)		88	6,698	3,766
7	11	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Floodplain Excavation (Scraper) & Local Haul		88	6,698	3,766
7	12	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Floodplain Fill, Grading, & Compaction Between Levees		88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	13	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Revetment		87	6,126	3,445
7	14	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures					
7	15	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)				
7	16	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Clearing & Grubbing	87	6,126	3,445
7	17	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Onsite Earthwork For Anchor Systems (Remove & Recompact)	84	4,462	2,509
7	18	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Dewatering	83	4,029	2,266
7	20	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Deliver Materials (CMI Atlanta GA, 2 Trucks)	76	1,774	998
7	21	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Construct Driving Guide & Use As Wales	83	4,029	2,266
7	22	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Sheet Pile Installation (Single Sheet 20'x420')	103	38,638	21,728
7	23	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Caps For Tops (20' Lengths Material & Labor)	83	4,029	2,266
7	24	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Anchor Support System (Pilings, Cable, Wales, Etc)	83	4,029	2,266
7	25	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Dust Control	79	2,376	1,336
7	26	GROUP 1	MPB Channel	Bypass Channel	Other Costs					
7	27	GROUP 1	MPB Channel	Bypass Channel	Other Costs	SWPPP		75	1,581	889
7	28	GROUP 1	MPB Channel	Bypass Channel	Other Costs	Worker Protection		82	3,529	1,984
7	29	GROUP 1	MPB Channel	Bypass Channel	Other Costs	Mobilization		80	2,963	1,666
7	397	GROUP 2	Reach 3							
7	398	GROUP 2	Reach 3	Levee Removal						
7	399	GROUP 2	Reach 3	Levee Removal	Haul Excess material by truck < 20 miles			88	6,698	3,766
7	400	GROUP 2	Reach 3	Levee Preparation						
7	401	GROUP 2	Reach 3	Levee Preparation	Clearing & Grubbing			87	6,126	3,445
7	402	GROUP 2	Reach 3	Levee Preparation	Tree Removal			87	6,126	3,445
7	403	GROUP 2	Reach 3	New Levee						

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	404	GROUP 2	Reach 3	New Levee	Compacted Embankment			88	6,698	3,766
7	405	GROUP 2	Reach 3	New Levee	Slurry Wall (10 Percent Of Total Levee Length)			87	6,126	3,445
7	406	GROUP 2	Reach 3	New Levee	USACE Trench Foundation			88	6,698	3,766
7	407	GROUP 2	Reach 3	New Levee	Borrow Excavation and Haul			88	6,698	3,766
7	408	GROUP 2	Reach 3	General						
7	409	GROUP 2	Reach 3	General	Seeding (Levee Slopes)			88	6,698	3,766
7	410	GROUP 2	Reach 3	General	Ramps & Turnabouts			88	6,698	3,766
7	411	GROUP 2	Reach 3	General	Levee Aggregate Base Roadway			88	6,698	3,766
7	412	GROUP 2	Reach 3	General	Haul Excess Material By Truck < 20 Miles (Drainage Channel)			88	6,698	3,766
7	413	GROUP 2	Reach 3	Mobilization				80	2,963	1,666
7	30	GROUP 3	Levees	Levees						
7	31	GROUP 3	Levees	Levees	Levee Preparation					
7	32	GROUP 3	Levees	Levees	Levee Preparation	Clearing & Grubbing		87	6,126	3,445
7	33	GROUP 3	Levees	Levees	Levee Preparation	Tree Removal		87	6,126	3,445
7	34	GROUP 3	Levees	Levees	Right Setback Levee					
7	35	GROUP 3	Levees	Levees	Right Setback Levee	Compacted Embankment		88	6,698	3,766
7	36	GROUP 3	Levees	Levees	Right Setback Levee	Slurry Wall (10 Percent Of Total Levee Length)		87	6,126	3,445
7	37	GROUP 3	Levees	Levees	Right Setback Levee	USACE Trench Foundation		88	6,698	3,766
7	38	GROUP 3	Levees	Levees	Right Setback Levee	Borrow Excavation (< 1 Mile)		88	6,698	3,766
7	39	GROUP 3	Levees	Levees	Left Setback Levee					
7	40	GROUP 3	Levees	Levees	Left Setback Levee	Compacted Embankment		88	6,698	3,766
7	41	GROUP 3	Levees	Levees	Left Setback Levee	Slurry Wall (10 Percent Of Total Levee Length)		87	6,126	3,445
7	42	GROUP 3	Levees	Levees	Left Setback Levee	USACE Trench Foundation		88	6,698	3,766
7	43	GROUP 3	Levees	Levees	Left Setback Levee	Borrow Excavation (< 1 Mile)		88	6,698	3,766
7	44	GROUP 3	Levees	Levees	General					
7	45	GROUP 3	Levees	Levees	General	Seeding (Levee Slopes)		88	6,698	3,766
7	46	GROUP 3	Levees	Levees	General	Ramps & Turnabouts		88	6,698	3,766
7	47	GROUP 3	Levees	Levees	General	Right Levee Aggregate Base Roadway		88	6,698	3,766
7	48	GROUP 3	Levees	Levees	General	Left Levee Aggregate Base Roadway		88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	49	GROUP 3	Levees	Levees	General	Haul Excess Material By Truck < 20 Miles (Drainage Channel)		88	6,698	3,766
7	50	GROUP 3	Levees	Levees	General	Mobilization		80	2,963	1,666
7	287	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)						
7	288	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure					
7	289	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Excavation For Spillway		88	6,698	3,766
7	290	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Compacted Backfill		88	6,698	3,766
7	291	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Cutoff Walls (Steel Sheet Piling)		103	38,638	21,728
7	292	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Precast prestressed concrete pile (14"x14"x20')		103	38,638	21,728
7	293	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Concrete		83	4,029	2,266
7	294	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Steel Reinforcement		83	4,029	2,266
7	295	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Waterstop		78	2,118	1,191
7	296	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates					
7	297	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	6 Radial Gates (Each 20'x8')		83	4,029	2,266
7	298	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Hoist (Motor Operated W/Wire Ropes)		83	4,029	2,266
7	299	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Embedded Metal (Stainless Steel)		83	4,029	2,266
7	300	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Steel Stoplogs 6 EA 21'x12' Deep Inc Ribs Etc		83	4,029	2,266
7	301	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Railing On Top Deck		83	4,029	2,266
7	302	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Railing On Bridge Deck		83	4,029	2,266
7	303	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Riprap		83	4,029	2,266
7	304	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Water Velocity & Flow Measurement System		81	3,070	1,727
7	305	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Propane Tank & Enclosure (15'x20'x6' HCB)		80	2,963	1,666
7	306	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Emergency Generator		82	3,529	1,984
7	307	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction					

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	308	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Excavation For Dam		83	4,029	2,266
7	309	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Compacted Embankment - Impervious Fill		88	6,698	3,766
7	310	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Compacted Embankment - Semipervious Fill		88	6,698	3,766
7	311	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Compacted Embankment - Pervious Fill		88	6,698	3,766
7	312	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Geotextile Fabric		80	2,963	1,666
7	313	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	9" Bedding		84	4,337	2,439
7	314	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Stone Slope Protection, Type 1		83	4,029	2,266
7	315	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Access Road (4" AC/6" AB, 24' Wide)		88	6,698	3,766
7	316	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	7' Chain Link Fence Including Barbed Wire		80	2,963	1,666
7	317	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Pipe Handrail (On U/S & D/S Side Of Dam)		83	4,029	2,266
7	318	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Automatic Entrance Gate (16' Wide)		81	3,070	1,727
7	319	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Mobilization		80	2,963	1,666
7	335	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)						
7	336	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure					
7	337	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Coffer Dam (Steel Sheet Piling Inc Bracing)		103	38,638	21,728
7	338	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Coffer Dam (Filling With Dirt & Removal)		103	38,638	21,728
7	339	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Dewatering (8 Months)		83	4,029	2,266
7	340	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Excavation For Spillway		88	6,698	3,766
7	341	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Compacted Backfill		88	6,698	3,766
7	342	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Cutoff Walls (Steel Sheet Piling)		103	38,638	21,728
7	343	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Precast Prestressed Concrete Pile (14"x14"x20')		103	38,638	21,728
7	344	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Concrete		83	4,029	2,266
7	345	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Steel Reinforcement		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	346	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Waterstop		78	2,118	1,191
7	347	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs					
7	348	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	4 Radial Gates (Each 16'x18')		83	4,029	2,266
7	349	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Hoist (Motor Operated W/Wire Ropes)		83	4,029	2,266
7	350	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Embedded Metal (Stainless Steel)		83	4,029	2,266
7	351	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Stoplog (Steel, Each 12'x21') Inc Ribs		83	4,029	2,266
7	352	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Railing On Top Deck		83	4,029	2,266
7	353	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Riprap		83	4,029	2,266
7	354	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Water Velocity & Flow Measurement System		81	3,070	1,727
7	355	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Propane Tank & Enclosure (15'x20'x6' HCB)		80	2,963	1,666
7	356	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Emergency Generator		80	2,963	1,666
7	357	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction					
7	358	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Coffer Dam (Filling With Dirt & Removal)		103	38,638	21,728
7	359	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Dewatering (6 Months)		83	4,029	2,266
7	360	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Excavation For dam		88	6,698	3,766
7	361	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Compacted Embankment - Impervious Fill		88	6,698	3,766
7	362	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Compacted Embankment - Semipervious Fill		88	6,698	3,766
7	363	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Compacted Embankment - Pervious Fill		88	6,698	3,766
7	364	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Geotextile Fabric		80	2,963	1,666
7	365	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	9" Bedding		84	4,337	2,439
7	366	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Stone Slope Protection, Type 1		83	4,029	2,266
7	367	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Access Road (4" AC/6" AB, 24' Wide)		88	6,698	3,766
7	368	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	7' Chain Link Fence Including Barbed Wire		80	2,963	1,666

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	369	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Pipe Handrail (On U/S & D/S Side Of Dam)		83	4,029	2,266
7	370	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Automatic Entrance Gate (16' Wide)		81	3,070	1,727
7	371	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Mobilization		80	2,963	1,666
7	192	GROUP 6	Fish Screen							
7	193	GROUP 6	Fish Screen	Fish Screen Structure						
7	194	GROUP 6	Fish Screen	Fish Screen Structure	Cofferdam (Steel Sheet Piling Including Bracing)			103	38,638	21,728
7	195	GROUP 6	Fish Screen	Fish Screen Structure	Cofferdam (Filling With Dirt & Removal)			103	38,638	21,728
7	196	GROUP 6	Fish Screen	Fish Screen Structure	Dewatering (For 8 Months)			83	4,029	2,266
7	197	GROUP 6	Fish Screen	Fish Screen Structure	Mobilization			80	2,963	1,666
7	198	GROUP 6	Fish Screen	Fish Screen Structure	Excavation			88	6,698	3,766
7	199	GROUP 6	Fish Screen	Fish Screen Structure	Backfill & Compaction			88	6,698	3,766
7	200	GROUP 6	Fish Screen	Fish Screen Structure	Concrete			83	4,029	2,266
7	201	GROUP 6	Fish Screen	Fish Screen Structure	Steel Reinforcement			83	4,029	2,266
7	202	GROUP 6	Fish Screen	Screen Panels				83	4,029	2,266
7	203	GROUP 6	Fish Screen	Flow Control Baffles (Same Size As Screen Panels)				83	4,029	2,266
7	204	GROUP 6	Fish Screen	Blocker Panels				83	4,029	2,266
7	205	GROUP 6	Fish Screen	Structural Steel - Framework For Screens, Baffles, & Blocker				83	4,029	2,266
7	206	GROUP 6	Fish Screen	Fish Screen Automatic Cleaner (Atlas ST8100)				83	4,029	2,266
7	208	GROUP 6	Fish Screen	Fish Return Pipes						
7	209	GROUP 6	Fish Screen	Fish Return Pipes	Pipe Trench Excavation (2:1 Side Slopes)			83	4,029	2,266
7	210	GROUP 6	Fish Screen	Fish Return Pipes	Pipe Bedding (CLSM To Depth Of 0.7 D, Cement Sand Slurry)			81	3,070	1,727
7	211	GROUP 6	Fish Screen	Fish Return Pipes	Backfill & Compaction (5' Above Pipe)			86	5,320	2,992
7	212	GROUP 6	Fish Screen	Fish Return Pipes	Concrete			83	4,029	2,266
7	213	GROUP 6	Fish Screen	Fish Return Pipes	Steel Reinforcement			83	4,029	2,266
7	214	GROUP 6	Fish Screen	Fish Return Pipes	Pipes (8 @ 1900 FT Each) 30" HDPE, SDR 32.5 Pipes			83	4,029	2,266
7	215	GROUP 6	Fish Screen	Fish Return Pipes	Access Manholes			83	4,029	2,266
7	216	GROUP 6	Fish Screen	Outlet Structure For Fish Return Pipes (TBD)						

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	217	GROUP 6	Fish Screen	Pump Station						
7	218	GROUP 6	Fish Screen	Pump Station	Excavation			88	6,698	3,766
7	219	GROUP 6	Fish Screen	Pump Station	Backfill			88	6,698	3,766
7	220	GROUP 6	Fish Screen	Pump Station	Concrete			83	4,029	2,266
7	221	GROUP 6	Fish Screen	Pump Station	Steel Reinforcement			83	4,029	2,266
7	222	GROUP 6	Fish Screen	Pump Station	Wemco-Hydrostal 30" Pump (16,000 GPM)			83	4,029	2,266
7	223	GROUP 6	Fish Screen	Pump Station	Open Frame Pitch Valve 30"			83	4,029	2,266
7	224	GROUP 6	Fish Screen	Control Building				80	2,963	1,666
7	225	GROUP 6	Fish Screen	Trashrack				83	4,029	2,266
7	226	GROUP 6	Fish Screen	Trashrake - 150' Long Across Four Vee Opening				83	4,029	2,266
7	228	GROUP 6	Fish Screen	Miscellaneous Metalwork (Handrail, Guardrail, & Fittings)				83	4,029	2,266
7	229	GROUP 6	Fish Screen	Mobilization				80	2,963	1,666
7	128	GROUP 7	Reach 2B Levee Extension FP-1							
7	129	GROUP 7	Reach 2B Levee Extension FP-1	Levees						
7	130	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)					
7	131	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	Levee Preparation				
7	132	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	Levee Preparation	Clearing & Grubbing	87	6,126	3,445
7	133	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	Levee Preparation	Tree Removal	87	6,126	3,445
7	134	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	Right Setback Levee				
7	135	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	Right Setback Levee	Compacted Embankment	88	6,698	3,766
7	136	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	Right Setback Levee	Slurry Wall (Total Levee Length)	87	6,126	3,445
7	137	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	Right Setback Levee	USACE Trench Foundation	88	6,698	3,766
7	138	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	Right Setback Levee	Borrow Excavation (< 1 Mile)	88	6,698	3,766
7	139	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	Left Setback Levee				
7	140	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	Left Setback Levee	Compacted Embankment	88	6,698	3,766
7	141	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	Left Setback Levee	Slurry Wall (Total Levee Length)	87	6,126	3,445
7	142	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	Left Setback Levee	USACE Trench Foundation	88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	143	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	Left Setback Levee	Borrow Excavation (< 1 Mile)	88	6,698	3,766
7	144	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	General				
7	145	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	General	Seeding (Levee Slopes)	88	6,698	3,766
7	146	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	General	Ramp & Turnabouts	88	6,698	3,766
7	147	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	General	Right Levee Aggregate Base Roadway	88	6,698	3,766
7	148	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	General	Left Levee Aggregate Base Roadway	88	6,698	3,766
7	149	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	General	Haul Excess Material By Truck (< 20 Miles, Drainage Channel)	88	6,698	3,766
7	150	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Levee Construction (Extension)	General	Mobilization	80	2,963	1,666
7	151	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Revetment					
7	152	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Revetment	Levee Revetment (6,800 Linear Feet)				
7	153	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Revetment	Levee Revetment (6,800 Linear Feet)	Mobilization & Demobilization (10%)	80	2,963	1,666
7	154	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Revetment	Levee Revetment (6,800 Linear Feet)	Clearing & Grubbing	87	6,126	3,445
7	155	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Revetment	Levee Revetment (6,800 Linear Feet)	Launch Rock	83	4,029	2,266
7	156	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Revetment	Levee Revetment (6,800 Linear Feet)	Rock Slope Protection	83	4,029	2,266
7	157	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Revetment	Levee Revetment (6,800 Linear Feet)	Clean Sand	83	4,029	2,266
7	158	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Revetment	Levee Revetment (6,800 Linear Feet)	Landscaping (Ag Soil, Plants, Etc)	82	3,544	1,993
7	159	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Revetment	Levee Revetment (6,800 Linear Feet)	Erosion Control	75	1,581	889
7	160	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Revetment	Levee Revetment (6,800 Linear Feet)	Environmental Mitigation (20% Of Subtotal)	75	1,581	889
7	161	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Revetment	Levee Revetment (6,800 Linear Feet)	Rock Slope - Labor	83	4,029	2,266
7	162	GROUP 7	Reach 2B Levee Extension FP-1	Levees	Revetment	Levee Revetment (6,800 Linear Feet)	Mobilization	80	2,963	1,666
7	163	GROUP 7	Reach 2B Levee Extension FP-1	Floodplain & Lands						
7	164	GROUP 7	Reach 2B Levee Extension FP-1	Floodplain & Lands	Levee Removal					

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	165	GROUP 7	Reach 2B Levee Extension FP-1	Floodplain & Lands	Levee Removal	Excavation Of Levee & Hauling Of Excess Material By Truck (< 20 Miles)		88	6,698	3,766
7	166	GROUP 7	Reach 2B Levee Extension FP-1	Floodplain & Lands	Levee Removal	Mobilization		80	2,963	1,666
7	372	GROUP 8	Reach 2B							
7	373	GROUP 8	Reach 2B	Compact Alignment Fish Barrier						
7	374	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Clearing & Grubbing			87	6,126	3,445
7	375	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Sheet Pile Coffer Dams			103	38,638	21,728
7	376	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Sheet Pile Removal			103	38,638	21,728
7	377	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Dewatering			83	4,029	2,266
7	378	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Rock Riprap Approaches - Labor			83	4,029	2,266
7	380	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Site Excavation (Excludes Bypass Channel)			88	6,698	3,766
7	381	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Engineered Fill			88	6,698	3,766
7	382	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Transition Road Construction (6" AB)			88	6,698	3,766
7	383	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Structural Concrete			84	4,462	2,509
7	384	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	18" Concrete Piles (30' Deep)			103	38,638	21,728
7	385	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Concrete Pile Cap			83	4,029	2,266
7	386	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Bridge Appurtenances			83	4,029	2,266
7	387	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Trash Rack & Bar Rack/Fish Barrier			83	4,029	2,266
7	388	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Steel Monorail Supports			83	4,029	2,266
7	389	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Traffic Guard Railing			83	4,029	2,266
7	390	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Generator & Transformer			83	4,029	2,266
7	391	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Bosker Trash Rake/Hoist			83	4,029	2,266
7	392	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Access Gates			81	3,070	1,727
7	393	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Dust Control			79	2,376	1,336
7	394	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	SWPPP			75	1,581	889

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	395	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Worker Protection			82	3,529	1,984
7	396	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Mobilization			80	2,963	1,666
7	414	GROUP 9	Fresno Slough Dam							
7	415	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined						
7	416	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General					
7	417	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General	Clearing & Grubbing		87	6,126	3,445
7	418	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General	Water For Dust Abatement		79	2,376	1,336
7	419	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General	SWPPP		75	1,581	889
7	420	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General	Worker Protection		82	3,529	1,984
7	421	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General	Bridge (30'x165')		83	4,029	2,266
7	422	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General	Bridge Appurtenances		83	4,029	2,266
7	423	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Canal Excavation					
7	424	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Canal Excavation	Course Canal Excavation (Loader & Dozer)		88	6,698	3,766
7	425	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Canal Excavation	Haul Off Site (<20 Miles, Main Canal)		88	6,698	3,766
7	426	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Canal Excavation	Concrete Liner @ 6" Thick		84	4,462	2,509
7	427	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Canal Excavation	Riprap Approach (25' x bottom Canal Width)		83	4,029	2,266
7	428	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)					
7	429	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)	Compacted Embankment		88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	430	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)	Inspection Trench (20% Of Levee Length)		88	6,698	3,766
7	431	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)	Seeding (Levee Slopes)		88	6,698	3,766
7	432	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)	Ramps & Turnabouts		88	6,698	3,766
7	433	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)	Levee Aggregate Base Roadway		88	6,698	3,766
7	434	GROUP 9	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)	Mobilization		80	2,963	1,666
7	51	GROUP 10	Relocations	Relocations						
7	52	GROUP 10	Relocations	Relocations	Utilities					
7	53	GROUP 10	Relocations	Relocations	Utilities	Overhead Electrical Distribution Removal & Replacement		83	4,029	2,266
7	54	GROUP 10	Relocations	Relocations	Utilities	Mobilization		80	2,963	1,666
7	55	GROUP 10	Relocations	Relocations	Canal					
7	56	GROUP 10	Relocations	Relocations	Canal	Canal Relocations		88	6,698	3,766
7	57	GROUP 10	Relocations	Relocations	Canal	Mobilization		80	2,963	1,666
7	58	GROUP 10	Relocations	Relocations	Pump Station					
7	59	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)				
7	60	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Clearing & Grubbing	87	6,126	3,445
7	61	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Canal & Drain Relocation	88	6,698	3,766
7	62	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Concrete Lining (Intake & Outfall)	83	4,029	2,266
7	63	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Rock Riprap At Outfall	83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	64	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Pump & Sump Relocation	83	4,029	2,266
7	65	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Replace Electrical Panel	81	3,070	1,727
7	66	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	PG&E Electrical Service	81	3,070	1,727
7	67	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	12" Steel Pipe	83	4,029	2,266
7	68	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Dust Control	79	2,376	1,336
7	69	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Worker Protection	82	3,529	1,984
7	70	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Mobilization	80	2,963	1,666
7	73	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Clearing & Grubbing	87	6,126	3,445
7	74	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Reinforced Concrete Pipe (72" RGRCP D-50 Pipe)	83	4,029	2,266
7	75	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Pipe Trench Excavation (2:1 Side Slopes)	83	4,029	2,266
7	76	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Pipe Bedding (CLSM To Depth Of 0.375D, Cement Sand Slurry)	81	3,070	1,727
7	77	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Pipe Backfill & Compaction (6' Above Pipe)	86	5,320	2,992

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	78	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Outlet Structure	84	4,226	2,376
7	79	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Pipe Appurtenances	83	4,029	2,266
7	80	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Dust Control	79	2,376	1,336
7	81	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	SWPPP	75	1,581	889
7	82	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Worker Protection	82	3,529	1,984
7	84	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Clearing & Grubbing	87	6,126	3,445
7	85	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Pumps & Structure	80	2,963	1,666
7	86	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Coffer Dam	103	38,638	21,728
7	87	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Dewatering Within Coffer Dam	83	4,029	2,266
7	88	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Removal Of Existing Pumps & Pipeline	83	4,029	2,266
7	89	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Dust Control	79	2,376	1,336
7	90	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	SWPPP	75	1,581	889
7	91	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Worker Protection	82	3,529	1,984
7	93	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)				
7	94	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Clearing & Grubbing	87	6,126	3,445
7	95	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Reinforced Concrete Pipe (30" RGRCP D-50 Pipe)	83	4,029	2,266
7	96	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Pipe Trench Excavation (2:1 Side Slopes)	83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	97	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Pipe Bedding (CLSM To Depth Of 0.375D, Cement Sand Slurry)	81	3,070	1,727
7	98	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Pipe Backfill & Compaction (6' Above Pipe)	86	5,320	2,992
7	99	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Pipe Appurtenances	83	4,029	2,266
7	100	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Dust Control	79	2,376	1,336
7	101	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	SWPPP	75	1,581	889
7	102	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Worker Protection	82	3,529	1,984
7	104	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)				
7	105	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Clearing & Grubbing	87	6,126	3,445
7	106	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Reinforced Concrete Pipe (24" RGRCP D-50 Pipe)	83	4,029	2,266
7	107	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Pipe Trench Excavation (2:1 Side Slopes)	83	4,029	2,266
7	108	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Pipe Bedding (CLSM To Depth Of 0.375D, Cement Sand Slurry)	81	3,070	1,727
7	109	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Pipe Backfill & Compaction (6' Above Pipe)	86	5,320	2,992
7	110	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Pipe Appurtenances	83	4,029	2,266
7	111	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Dust Control	79	2,376	1,336
7	112	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	SWPPP	75	1,581	889
7	113	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Worker Protection	82	3,529	1,984

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	114	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Mobilization	80	2,963	1,666
7	116	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)				
7	117	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Clearing & Grubbing	87	6,126	3,445
7	118	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Earthwork (Loader & Truck)	88	6,698	3,766
7	119	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Revegetation	88	6,698	3,766
7	120	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Pull Pump & Column & Install After Modifications	83	4,029	2,266
7	121	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Column Extension	83	4,029	2,266
7	122	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Casing Extension	83	4,029	2,266
7	123	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Discharge Pipe Modifications	83	4,029	2,266
7	124	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Replace Electrical Panel	81	3,070	1,727
7	125	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	PG&E Electrical Service	81	3,070	1,727
7	126	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Dust Control	79	2,376	1,336
7	127	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Mobilization	80	2,963	1,666
7	230	GROUP 11	Columbia Canal Company Relocation Facilities							
7	231	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS						
7	232	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Clearing & Grubbing			87	6,126	3,445

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	233	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Site Excavation			88	6,698	3,766
7	234	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Structure Backfill			88	6,698	3,766
7	235	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Structure Concrete			83	4,029	2,266
7	236	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Pumps & Motors (50 HP)			83	4,029	2,266
7	237	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Pump & Motor With VFD & Appurtenances (50 HP)			83	4,029	2,266
7	238	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Pumps & Motors (75 HP)			83	4,029	2,266
7	239	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Pump & Motor With VFD & Appurtenances (75 HP)			83	4,029	2,266
7	240	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Pump Control Building (16'x8')			80	2,963	1,666
7	241	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	72" Steel Pipe			84	4,462	2,509
7	242	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	36" Pump Discharge Assemblies			80	2,963	1,666
7	243	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Trashrack			83	4,029	2,266
7	244	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Miscellaneous Metals			83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	245	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Excavate Ditch To Connect Pump Inlet To River Thalweg			88	6,698	3,766
7	246	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Flow Meter (Ultrasonic In Each Pipe Within Concrete Vault)			84	4,462	2,509
7	247	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Coffer Dam			103	38,638	21,728
7	248	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Dewatering Within Coffer Dam			83	4,029	2,266
7	249	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Dust Control			79	2,376	1,336
7	250	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	SWPPP			75	1,581	889
7	251	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Worker Protection			82	3,529	1,984
7	253	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Clearing & Grubbing			87	6,126	3,445
7	254	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Reinforced Concrete Pipe (RCP) - Two 72" D-50 Pipes			83	4,029	2,266
7	255	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Reinforced Concrete Pipe (RCP) - 72" Bends			83	4,029	2,266
7	256	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Pipe Trench Excavation (2:1 Side Slopes)			83	4,029	2,266
7	257	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Pipe Bedding (CLSM To Depth Of 0.5D, Cement Sand Slurry)			81	3,070	1,727

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	258	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Pipe Backfill & Compaction (15' Above Pipe)			86	5,320	2,992
7	259	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Dust Control			79	2,376	1,336
7	260	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	SWPPP			75	1,581	889
7	261	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Worker Protection			82	3,529	1,984
7	262	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures						
7	263	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Clearing & Grubbing			87	6,126	3,445
7	264	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Structure Backfill			88	6,698	3,766
7	265	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Structure Concrete (Check Structure & Headwalls)			83	4,029	2,266
7	266	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	72" Gate			83	4,029	2,266
7	267	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Riprap Facing Class Purchase, 100 LB/CF, 2' Deep			83	4,029	2,266
7	268	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Rock Riprap Approaches / Outfalls & Side Slope Protection, 2' Deep			83	4,029	2,266
7	269	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Dust Control			79	2,376	1,336

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	270	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	SWPPP			75	1,581	889
7	271	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Worker Protection			82	3,529	1,984
7	273	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Clearing & Grubbing			87	6,126	3,445
7	274	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Demolish Old Pump Structure, Flume, & Disposal			87	6,126	3,445
7	275	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Onsite Excavation			88	6,698	3,766
7	276	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Loader / Excavator & Truck For Material (Compacted Vol + 20%)			88	6,698	3,766
7	277	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Haul Truck (Less Than 20 Miles, Compacted Vol + 20%)			88	6,698	3,766
7	278	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Earthwork Fill & Compaction			88	6,698	3,766
7	279	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Canal Lining At 6" Thick			83	4,029	2,266
7	280	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Purchasing & Hauling Gravel For Roadway, 100 LB/CF			86	5,617	3,159
7	281	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Gravel Placement, New Road, 6" Thick, 4,000 LF On Both Banks			88	6,698	3,766
7	282	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Structure Concrete (Check Structure)			83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	283	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Dust Control			79	2,376	1,336
7	284	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	SWPPP			75	1,581	889
7	285	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Worker Protection			82	3,529	1,984
7	286	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Mobilization			80	2,963	1,666
7	435	GROUP 12	Relocations SJR Bypass Canal South Option							
7	436	GROUP 12	Relocations SJR Bypass Canal South Option	Canal						
7	437	GROUP 12	Relocations SJR Bypass Canal South Option	Canal	Canal Relocations			88	6,698	3,766
7	438	GROUP 12	Relocations SJR Bypass Canal South Option	Canal	Mobilization			80	2,963	1,666
7	439	GROUP 12	Relocations SJR Bypass Canal South Option	Utilities						
7	440	GROUP 12	Relocations SJR Bypass Canal South Option	Utilities	Overhead Electrical Distribution Removal & Replacement			83	4,029	2,266
7	441	GROUP 12	Relocations SJR Bypass Canal South Option	Utilities	Mobilization			80	2,963	1,666
7	442	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station						
7	443	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)					
7	444	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Clearing & Grubbing		87	6,126	3,445

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	445	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Canal/Drain Relocation		88	6,698	3,766
7	446	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Concrete Lining (Intake & Outfall)		83	4,029	2,266
7	447	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Rock Riprap At Outfall		83	4,029	2,266
7	448	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Pump & Sump Relocation		83	4,029	2,266
7	449	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Replace Electrical Panel		81	3,070	1,727
7	450	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	PG&E Electrical Service		81	3,070	1,727
7	451	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	12" Steel Pipe		83	4,029	2,266
7	452	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Dust Control		79	2,376	1,336
7	453	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Worker Protection		82	3,529	1,984
7	454	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Mobilization		80	2,963	1,666
7	455	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing						
7	456	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)					
7	457	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Clearing & Grubbing		87	6,126	3,445

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	458	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Earthwork (Loader & Truck)		88	6,698	3,766
7	459	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Revegetation		88	6,698	3,766
7	460	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Pull Pump & Column and Reinstall After Modifications		83	4,029	2,266
7	461	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Column Extension		83	4,029	2,266
7	462	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Casing Extension		83	4,029	2,266
7	463	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Discharge Pipe Modifications		83	4,029	2,266
7	464	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Replace Electrical Panel		81	3,070	1,727
7	465	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	PG&E Electrical Service		81	3,070	1,727
7	466	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Dust Control		79	2,376	1,336
7	467	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Mobilization		80	2,963	1,666
7	320	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure						
7	321	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Concrete			83	4,029	2,266
7	322	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Reinforcing Steel			83	4,029	2,266
7	323	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Steel Grating			83	4,029	2,266
7	324	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Steel Slide Compression Gate			83	4,029	2,266
7	325	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Adjustable Steel Slot Weir			83	4,029	2,266
7	326	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Steel Slide Compression Gate for Pipe Diversion			83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	327	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Steel Slide Compression Gate for Supplim. Flow Pipe			83	4,029	2,266
7	328	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Fish Screen			83	4,029	2,266
7	329	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Trash Rack			83	4,029	2,266
7	330	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Automated Trash Rack Screen Cleaner			83	4,029	2,266
7	331	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Steel Slide Gate Operator Control			83	4,029	2,266
7	332	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	60" Diameter Steel Pipe			83	4,029	2,266
7	333	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	84" Diameter Steel Pipe			84	4,462	2,509
7	334	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Mobilization			80	2,963	1,666
7	468	GROUP 14	Fresno Slough Dam							
7	469	GROUP 14	Fresno Slough Dam	SJR Control Structure						
7	470	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment					
7	471	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Clearing & Grubbing		87	6,126	3,445
7	472	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Cofferdam		103	38,638	21,728
7	473	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Cofferdam Removal		103	38,638	21,728
7	474	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
7	475	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Dewatering		83	4,029	2,266
7	476	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Excavation To Stockpile		88	6,698	3,766
7	477	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Excavation To Disposal Off Site		88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	478	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Gravel Base		88	6,698	3,766
7	479	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure					
7	480	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	12" Square Concrete Piles		103	38,638	21,728
7	481	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Concrete		83	4,029	2,266
7	482	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Reinforcing Steel		83	4,029	2,266
7	483	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Carbon/Galvanized Steel		83	4,029	2,266
7	484	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Stainless Steel		83	4,029	2,266
7	485	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Pipe Handrail		83	4,029	2,266
7	486	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Guardrail		83	4,029	2,266
7	487	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates					
7	488	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Tainter Gate Steel		83	4,029	2,266
7	489	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Motor Operated Hoist W/Wire Ropes		83	4,029	2,266
7	490	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trash Rack - Miscellaneous Steel		83	4,029	2,266
7	491	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trash Rack - Stainless Steel		83	4,029	2,266
7	492	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trash Rack - Nelson Studs		83	4,029	2,266
7	493	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trashrake Units		83	4,029	2,266
7	494	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trashrake - Structure Support Steel		83	4,029	2,266
7	495	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Rock Slope Protection		83	4,029	2,266
7	496	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment					
7	497	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Compacted Embankment - From Stockpile		88	6,698	3,766
7	498	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Compacted Embankment - Core Material		88	6,698	3,766
7	499	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Geotextile Fabric		80	2,963	1,666
7	500	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	9" Bedding		84	4,337	2,439

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	501	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Stone Slope Protection, Type 1		83	4,029	2,266
7	502	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Access Road (4" AC / 6" AB, 24' Wide)		88	6,698	3,766
7	503	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Chain Link Fence W/Barbed Wire		80	2,963	1,666
7	504	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Automatic Entrance Gate		81	3,070	1,727
7	505	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment					
7	506	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Compacted Embankment From Stockpile		88	6,698	3,766
7	507	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Compacted Embankment - Core Material		88	6,698	3,766
7	508	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Geotextile Fabric		80	2,963	1,666
7	509	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	9" Bedding		84	4,337	2,439
7	510	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Stone Slope Protection, Type 1		83	4,029	2,266
7	511	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Access Road (4" AC / 6" AB, 24' Wide)		88	6,698	3,766
7	512	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Chain Link Fence W/Barbed Wire		80	2,963	1,666
7	513	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Automatic Entrance Gate		81	3,070	1,727
7	514	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Mobilization		80	2,963	1,666
7	515	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation					
7	516	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Clearing & Grubbing		87	6,126	3,445
7	517	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Cofferdam		103	38,638	21,728
7	518	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Cofferdam Removal		103	38,638	21,728
7	519	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
7	520	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Dewatering		83	4,029	2,266
7	521	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Excavation To Stockpile		88	6,698	3,766
7	522	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Excavation To Disposal Off Site		88	6,698	3,766
7	523	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Gravel Base		88	6,698	3,766
7	524	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure					

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	525	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Concrete		83	4,029	2,266
7	526	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Reinforcing Steel		83	4,029	2,266
7	527	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Grating		83	4,029	2,266
7	528	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate		83	4,029	2,266
7	529	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Adjustable Steel Slot Weir		83	4,029	2,266
7	530	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate for Pipe Diversion		83	4,029	2,266
7	531	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate for Supplim. Flow Pipe		83	4,029	2,266
7	532	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Fish Screen		83	4,029	2,266
7	533	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Trash Rack		83	4,029	2,266
7	534	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Automated Trash Rack Screen Cleaner		83	4,029	2,266
7	535	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Slide Gate Operator Control		81	3,070	1,727
7	536	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	60" Steel Pipe		83	4,029	2,266
7	537	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	84" Steel Pipe		83	4,029	2,266
7	538	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Mobilization		80	2,963	1,666
7	539	GROUP 15	Fresno Slough Dam							
7	540	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen						
7	541	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork					

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	542	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Clearing & Grubbing		87	6,126	3,445
7	543	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Cofferdam		103	38,638	21,728
7	544	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Cofferdam Removal		103	38,638	21,728
7	545	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
7	546	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Dewatering		83	4,029	2,266
7	547	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Excavation To Stockpile		88	6,698	3,766
7	548	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Excavation To Disposal Off Site		88	6,698	3,766
7	549	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Gravel Base		88	6,698	3,766
7	550	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure					
7	551	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Concrete		83	4,029	2,266
7	552	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Reinforcing Steel		83	4,029	2,266
7	553	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Miscellaneous Metals		83	4,029	2,266
7	554	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Steel Members		83	4,029	2,266
7	555	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Fish Screen		83	4,029	2,266
7	556	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Adjustable Baffles		83	4,029	2,266
7	557	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Automated Screen Brush Cleaners		83	4,029	2,266
7	558	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Scour Protection		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	559	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Electric Winches For Vertical Slide Gates		83	4,029	2,266
7	560	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen					
7	561	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Compacted Embankment - From Stockpile		88	6,698	3,766
7	562	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Compacted Embankment - Core Material		88	6,698	3,766
7	563	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Geotextile Fabric		80	2,963	1,666
7	564	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	9" Bedding		84	4,337	2,439
7	565	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Stone Slope Protection, Type 1		83	4,029	2,266
7	566	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Access Road (4" AC / 6" AB, 24' Wide)		88	6,698	3,766
7	567	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Chain Link Fence W/Barbed Wire		80	2,963	1,666
7	568	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Automatic Entrance Gate		81	3,070	1,727
7	569	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure					
7	570	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure	Concrete		83	4,029	2,266
7	571	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure	Reinforcing Steel		83	4,029	2,266
7	572	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure	48" Steel Pipe		83	4,029	2,266
7	573	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure	Mobilization		80	2,963	1,666
7	574	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure					
7	575	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Clearing & Grubbing		87	6,126	3,445

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	576	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Excavation To Stockpile		88	6,698	3,766
7	577	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Excavation To Disposal Off Site		88	6,698	3,766
7	578	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
7	579	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure					
7	580	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	12" Square Concrete Piles		103	38,638	21,728
7	581	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Concrete		83	4,029	2,266
7	582	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Reinforcing Steel		83	4,029	2,266
7	583	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Carbon/Galvanized Steel		83	4,029	2,266
7	584	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Stainless Steel		83	4,029	2,266
7	585	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Pipe Handrail		83	4,029	2,266
7	586	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Guardrail		83	4,029	2,266
7	587	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates					
7	588	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Tainter Gate Steel		83	4,029	2,266
7	589	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Motor Operated Hoist W/Wire Ropes		83	4,029	2,266
7	590	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trash Rack - Miscellaneous Steel		83	4,029	2,266
7	591	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trash Rack - Stainless Steel		83	4,029	2,266
7	592	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trash Rack - Nelson Suds		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	593	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trashrake Units		83	4,029	2,266
7	594	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trashrake - Structural Support Steel		83	4,029	2,266
7	595	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Rock Slope Protection		83	4,029	2,266
7	596	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments					
7	597	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Compacted Embankment - From Stockpile		88	6,698	3,766
7	598	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Compacted Embankment - Core Material		88	6,698	3,766
7	599	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Access Road (4" AC / 6" AB, 24' Wide)		88	6,698	3,766
7	600	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Chain Link Fence W/Barbed Wire		80	2,963	1,666
7	601	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Automated Entrance Gate		81	3,070	1,727
7	602	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Mobilization		80	2,963	1,666
7	167	GROUP 16	Vegetation & Irrigation							
7	168	GROUP 16	Vegetation & Irrigation	General Description						
7	169	GROUP 16	Vegetation & Irrigation	General Description	Plant Establishment (12 Months)			81	3,070	1,727
7	170	GROUP 16	Vegetation & Irrigation	General Description	Landscape Maintenance (12 Months Or As Needed)			81	3,070	1,727
7	171	GROUP 16	Vegetation & Irrigation	General Description	Agricultural Topsoil (6" Layer)			88	6,698	3,766
7	172	GROUP 16	Vegetation & Irrigation	General Description	Erosion Control Fabric			80	2,963	1,666
7	173	GROUP 16	Vegetation & Irrigation	General Description	Irrigation System			81	3,070	1,727
7	174	GROUP 16	Vegetation & Irrigation	General Description	Beaver Fence			80	2,963	1,666
7	175	GROUP 16	Vegetation & Irrigation	General Description	Seeding			88	6,698	3,766
7	176	GROUP 16	Vegetation & Irrigation	General Description	Pole Cuttings			80	2,963	1,666

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
7	177	GROUP 16	Vegetation & Irrigation	General Description	Fascine Bundle			80	2,963	1,666
7	178	GROUP 16	Vegetation & Irrigation	General Description	Instream Woody Material			80	2,963	1,666
7	182	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation T4 - Cbm			81	3,070	1,727
7	183	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation DP - Cmb			81	3,070	1,727
7	184	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation DP - Crg			81	3,070	1,727
7	185	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation DP - Rbh			81	3,070	1,727
7	186	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation DP - Sgf			81	3,070	1,727
7	189	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation D6 - Swt			81	3,070	1,727
7	190	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation D6 - Bwt			81	3,070	1,727
7	191	GROUP 16	Vegetation & Irrigation	General Description	Mobilization			80	2,963	1,666
8	1	GROUP 1	MPB Channel							
8	2	GROUP 1	MPB Channel	Bypass Channel						
8	3	GROUP 1	MPB Channel	Bypass Channel	General					
8	4	GROUP 1	MPB Channel	Bypass Channel	General	Clearing & Grubbing		87	6,126	3,445
8	5	GROUP 1	MPB Channel	Bypass Channel	General	Water For Dust Abatement		79	2,376	1,336
8	6	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation					
8	7	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Course Channel Excavation (Scraper) & Local Haul		88	6,698	3,766
8	8	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Course Channel Excavation (Loader & Dozer)		88	6,698	3,766
8	9	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Fine Channel Excavation & Shaping (Excavator)		84	4,462	2,509
8	10	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Haul Off Site (<20 Miles)		88	6,698	3,766
8	11	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Floodplain Excavation (Scraper) & Local Haul		88	6,698	3,766
8	12	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Floodplain Fill, Grading, & Compaction Between Levees		88	6,698	3,766
8	13	GROUP 1	MPB Channel	Bypass Channel	Channel and Floodplain Excavation	Revetment		87	6,126	3,445
8	14	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures					

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	15	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)				
8	16	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Clearing & Grubbing	87	6,126	3,445
8	17	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Onsite Earthwork For Anchor Systems (Remove & Recompact)	84	4,462	2,509
8	18	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Dewatering	83	4,029	2,266
8	20	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Deliver Materials (CMI Atlanta GA, 2 Trucks)	76	1,774	998
8	21	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Construct Driving Guide & Use As Wales	83	4,029	2,266
8	22	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Sheet Pile Installation (Single Sheet 20'x420')	103	38,638	21,728
8	23	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Caps For Tops (20' Lengths Material & Labor)	83	4,029	2,266
8	24	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Anchor Support System (Pilings, Cable, Wales, Etc)	83	4,029	2,266
8	25	GROUP 1	MPB Channel	Bypass Channel	Grade Control Structures	Single Wall, Anchored, Sheet Pipe Structures (9 Each Structures)	Dust Control	79	2,376	1,336
8	26	GROUP 1	MPB Channel	Bypass Channel	Other Costs					
8	27	GROUP 1	MPB Channel	Bypass Channel	Other Costs	SWPPP		75	1,581	889
8	28	GROUP 1	MPB Channel	Bypass Channel	Other Costs	Worker Protection		82	3,529	1,984
8	29	GROUP 1	MPB Channel	Bypass Channel	Other Costs	Mobilization		85	5,244	2,949
8	397	GROUP 2	Reach 3							
8	398	GROUP 2	Reach 3	Levee Removal						
8	399	GROUP 2	Reach 3	Levee Removal	Haul Excess material by truck < 20 miles			88	6,698	3,766
8	400	GROUP 2	Reach 3	Levee Preparation						
8	401	GROUP 2	Reach 3	Levee Preparation	Clearing & Grubbing			87	6,126	3,445
8	402	GROUP 2	Reach 3	Levee Preparation	Tree Removal			87	6,126	3,445
8	403	GROUP 2	Reach 3	New Levee						
8	404	GROUP 2	Reach 3	New Levee	Compacted Embankment			88	6,698	3,766
8	405	GROUP 2	Reach 3	New Levee	Slurry Wall (10 Percent Of Total Levee Length)			87	6,126	3,445

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	406	GROUP 2	Reach 3	New Levee	USACE Trench Foundation			88	6,698	3,766
8	407	GROUP 2	Reach 3	New Levee	Borrow Excavation and Haul			88	6,698	3,766
8	408	GROUP 2	Reach 3	General						
8	409	GROUP 2	Reach 3	General	Seeding (Levee Slopes)			88	6,698	3,766
8	410	GROUP 2	Reach 3	General	Ramps & Turnabouts			88	6,698	3,766
8	411	GROUP 2	Reach 3	General	Levee Aggregate Base Roadway			88	6,698	3,766
8	412	GROUP 2	Reach 3	General	Haul Excess Material By Truck < 20 Miles (Drainage Channel)			88	6,698	3,766
8	413	GROUP 2	Reach 3	Mobilization				80	2,963	1,666
8	30	GROUP 3	Levees	Levees						
8	31	GROUP 3	Levees	Levees	Levee Preparation					
8	32	GROUP 3	Levees	Levees	Levee Preparation	Clearing & Grubbing		87	6,126	3,445
8	33	GROUP 3	Levees	Levees	Levee Preparation	Tree Removal		87	6,126	3,445
8	34	GROUP 3	Levees	Levees	Right Setback Levee					
8	35	GROUP 3	Levees	Levees	Right Setback Levee	Compacted Embankment		88	6,698	3,766
8	36	GROUP 3	Levees	Levees	Right Setback Levee	Slurry Wall (10 Percent Of Total Levee Length)		87	6,126	3,445
8	37	GROUP 3	Levees	Levees	Right Setback Levee	USACE Trench Foundation		88	6,698	3,766
8	38	GROUP 3	Levees	Levees	Right Setback Levee	Borrow Excavation (< 1 Mile)		88	6,698	3,766
8	39	GROUP 3	Levees	Levees	Left Setback Levee					
8	40	GROUP 3	Levees	Levees	Left Setback Levee	Compacted Embankment		88	6,698	3,766
8	41	GROUP 3	Levees	Levees	Left Setback Levee	Slurry Wall (10 Percent Of Total Levee Length)		87	6,126	3,445
8	42	GROUP 3	Levees	Levees	Left Setback Levee	USACE Trench Foundation		88	6,698	3,766
8	43	GROUP 3	Levees	Levees	Left Setback Levee	Borrow Excavation (< 1 Mile)		88	6,698	3,766
8	44	GROUP 3	Levees	Levees	General					
8	45	GROUP 3	Levees	Levees	General	Seeding (Levee Slopes)		88	6,698	3,766
8	46	GROUP 3	Levees	Levees	General	Ramps & Turnabouts		88	6,698	3,766
8	47	GROUP 3	Levees	Levees	General	Right Levee Aggregate Base Roadway		88	6,698	3,766
8	48	GROUP 3	Levees	Levees	General	Left Levee Aggregate Base Roadway		88	6,698	3,766
8	49	GROUP 3	Levees	Levees	General	Haul Excess Material By Truck < 20 Miles (Drainage Channel)		85	5,113	2,875

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	50	GROUP 3	Levees	Levees	General	Mobilization		82	3,529	1,984
8	287	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)						
8	288	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure					
8	289	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Excavation For Spillway		88	6,698	3,766
8	290	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Compacted Backfill		88	6,698	3,766
8	291	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Cutoff Walls (Steel Sheet Piling)		103	38,638	21,728
8	292	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Precast prestressed concrete pile (14"x14"x20')		103	38,638	21,728
8	293	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Concrete		83	4,029	2,266
8	294	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Steel Reinforcement		83	4,029	2,266
8	295	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Spillway Structure	Waterstop		78	2,118	1,191
8	296	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates					
8	297	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	6 Radial Gates (Each 20'x8')		83	4,029	2,266
8	298	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Hoist (Motor Operated W/Wire Ropes)		83	4,029	2,266
8	299	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Embedded Metal (Stainless Steel)		83	4,029	2,266
8	300	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Steel Stoplogs 6 EA 21'x12' Deep Inc Ribs Etc		83	4,029	2,266
8	301	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Railing On Top Deck		83	4,029	2,266
8	302	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Railing On Bridge Deck		83	4,029	2,266
8	303	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Riprap		83	4,029	2,266
8	304	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Water Velocity & Flow Measurement System		81	3,070	1,727
8	305	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Propane Tank & Enclosure (15'x20'x6' HCB)		80	2,963	1,666
8	306	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Radial Gates	Emergency Generator		82	3,529	1,984
8	307	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction					
8	308	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Excavation For Dam		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	309	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Compacted Embankment - Impervious Fill		88	6,698	3,766
8	310	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Compacted Embankment - Semipervious Fill		88	6,698	3,766
8	311	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Compacted Embankment - Pervious Fill		88	6,698	3,766
8	312	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Geotextile Fabric		80	2,963	1,666
8	313	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	9" Bedding		84	4,337	2,439
8	314	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Stone Slope Protection, Type 1		83	4,029	2,266
8	315	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Access Road (4" AC/6" AB, 24' Wide)		88	6,698	3,766
8	316	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	7' Chain Link Fence Including Barbed Wire		80	2,963	1,666
8	317	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Pipe Handrail (On U/S & D/S Side Of Dam)		83	4,029	2,266
8	318	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Automatic Entrance Gate (16' Wide)		81	3,070	1,727
8	319	GROUP 4	Diversion Structure (Bypass Channel)	Diversion Structure (Bypass Channel)	Dam Construction	Mobilization		80	2,963	1,666
8	335	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)						
8	336	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure					
8	337	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Coffer Dam (Steel Sheet Piling Inc Bracing)		103	38,638	21,728
8	338	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Coffer Dam (Filling With Dirt & Removal)		103	38,638	21,728
8	339	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Dewatering (8 Months)		83	4,029	2,266
8	340	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Excavation For Spillway		88	6,698	3,766
8	341	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Compacted Backfill		88	6,698	3,766
8	342	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Cutoff Walls (Steel Sheet Piling)		103	38,638	21,728
8	343	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Precast Prestressed Concrete Pile (14"x14"x20')		103	38,638	21,728
8	344	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Concrete		83	4,029	2,266
8	345	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Steel Reinforcement		83	4,029	2,266
8	346	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Spillway Structure	Waterstop		78	2,118	1,191

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	347	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs					
8	348	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	4 Radial Gates (Each 16'x18')		83	4,029	2,266
8	349	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Hoist (Motor Operated W/Wire Ropes)		83	4,029	2,266
8	350	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Embedded Metal (Stainless Steel)		83	4,029	2,266
8	351	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Stoplog (Steel, Each 12'x21') Inc Ribs		83	4,029	2,266
8	352	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Railing On Top Deck		83	4,029	2,266
8	353	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Riprap		83	4,029	2,266
8	354	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Water Velocity & Flow Measurement System		81	3,070	1,727
8	355	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Propane Tank & Enclosure (15'x20'x6' HCB)		80	2,963	1,666
8	356	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Radial Gates & Stoplogs	Emergency Generator		80	2,963	1,666
8	357	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction					
8	358	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Coffer Dam (Filling With Dirt & Removal)		103	38,638	21,728
8	359	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Dewatering (6 Months)		83	4,029	2,266
8	360	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Excavation For dam		88	6,698	3,766
8	361	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Compacted Embankment - Impervious Fill		88	6,698	3,766
8	362	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Compacted Embankment - Semipervious Fill		88	6,698	3,766
8	363	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Compacted Embankment - Pervious Fill		88	6,698	3,766
8	364	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Geotextile Fabric		80	2,963	1,666
8	365	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	9" Bedding		84	4,337	2,439
8	366	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Stone Slope Protection, Type 1		83	4,029	2,266
8	367	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Access Road (4" AC/6" AB, 24' Wide)		88	6,698	3,766
8	368	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	7' Chain Link Fence Including Barbed Wire		80	2,963	1,666
8	369	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Pipe Handrail (On U/S & D/S Side Of Dam)		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	370	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Automatic Entrance Gate (16' Wide)		81	3,070	1,727
8	371	GROUP 5	Diversion Structure (SJR)	Diversion Structure (SJR)	Dam Construction	Mobilization		80	2,963	1,666
8	192	GROUP 6	Fish Screen							
8	193	GROUP 6	Fish Screen	Fish Screen Structure						
8	194	GROUP 6	Fish Screen	Fish Screen Structure	Cofferdam (Steel Sheet Piling Including Bracing)			103	38,638	21,728
8	195	GROUP 6	Fish Screen	Fish Screen Structure	Cofferdam (Filling With Dirt & Removal)			103	38,638	21,728
8	196	GROUP 6	Fish Screen	Fish Screen Structure	Dewatering (For 8 Months)			83	4,029	2,266
8	197	GROUP 6	Fish Screen	Fish Screen Structure	Mobilization			80	2,963	1,666
8	198	GROUP 6	Fish Screen	Fish Screen Structure	Excavation			88	6,698	3,766
8	199	GROUP 6	Fish Screen	Fish Screen Structure	Backfill & Compaction			88	6,698	3,766
8	200	GROUP 6	Fish Screen	Fish Screen Structure	Concrete			83	4,029	2,266
8	201	GROUP 6	Fish Screen	Fish Screen Structure	Steel Reinforcement			83	4,029	2,266
8	202	GROUP 6	Fish Screen	Screen Panels				83	4,029	2,266
8	203	GROUP 6	Fish Screen	Flow Control Baffles (Same Size As Screen Panels)				83	4,029	2,266
8	204	GROUP 6	Fish Screen	Blocker Panels				83	4,029	2,266
8	205	GROUP 6	Fish Screen	Structural Steel - Framework For Screens, Baffles, & Blocker				83	4,029	2,266
8	206	GROUP 6	Fish Screen	Fish Screen Automatic Cleaner (Atlas ST8100)				83	4,029	2,266
8	208	GROUP 6	Fish Screen	Fish Return Pipes						
8	209	GROUP 6	Fish Screen	Fish Return Pipes	Pipe Trench Excavation (2:1 Side Slopes)			83	4,029	2,266
8	210	GROUP 6	Fish Screen	Fish Return Pipes	Pipe Bedding (CLSM To Depth Of 0.7 D, Cement Sand Slurry)			81	3,070	1,727
8	211	GROUP 6	Fish Screen	Fish Return Pipes	Backfill & Compaction (5' Above Pipe)			86	5,320	2,992
8	212	GROUP 6	Fish Screen	Fish Return Pipes	Concrete			83	4,029	2,266
8	213	GROUP 6	Fish Screen	Fish Return Pipes	Steel Reinforcement			83	4,029	2,266
8	214	GROUP 6	Fish Screen	Fish Return Pipes	Pipes (8 @ 1900 FT Each) 30" HDPE, SDR 32.5 Pipes			83	4,029	2,266
8	215	GROUP 6	Fish Screen	Fish Return Pipes	Access Manholes			83	4,029	2,266
8	217	GROUP 6	Fish Screen	Pump Station						
8	218	GROUP 6	Fish Screen	Pump Station	Excavation			88	6,698	3,766
8	219	GROUP 6	Fish Screen	Pump Station	Backfill			88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	220	GROUP 6	Fish Screen	Pump Station	Concrete			83	4,029	2,266
8	221	GROUP 6	Fish Screen	Pump Station	Steel Reinforcement			83	4,029	2,266
8	222	GROUP 6	Fish Screen	Pump Station	Wemco-Hydrostal 30" Pump (16,000 GPM)			83	4,029	2,266
8	223	GROUP 6	Fish Screen	Pump Station	Open Frame Pitch Valve 30"			83	4,029	2,266
8	224	GROUP 6	Fish Screen	Control Building				80	2,963	1,666
8	225	GROUP 6	Fish Screen	Trashrack				83	4,029	2,266
8	226	GROUP 6	Fish Screen	Trashrake - 150' Long Across Four Vee Opening				83	4,029	2,266
8	228	GROUP 6	Fish Screen	Miscellaneous Metalwork (Handrail, Guardrail, & Fittings)				83	4,029	2,266
8	229	GROUP 6	Fish Screen	Mobilization				80	2,963	1,666
8	128	GROUP 7	Reach 2B Levee Extension FP-5							
8	129	GROUP 7	Reach 2B Levee Extension FP-5	Levees						
8	130	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)					
8	131	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	Levee Preparation				
8	132	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	Levee Preparation	Clearing & Grubbing	87	6,126	3,445
8	133	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	Levee Preparation	Tree Removal	87	6,126	3,445
8	134	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	Right Setback Levee				
8	135	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	Right Setback Levee	Compacted Embankment	88	6,698	3,766
8	136	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	Right Setback Levee	Slurry Wall (Total Levee Length)	87	6,126	3,445
8	137	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	Right Setback Levee	USACE Trench Foundation	88	6,698	3,766
8	138	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	Right Setback Levee	Borrow Excavation (< 1 Mile)	88	6,698	3,766
8	139	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	Left Setback Levee				
8	140	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	Left Setback Levee	Compacted Embankment	88	6,698	3,766
8	141	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	Left Setback Levee	Slurry Wall (Total Levee Length)	87	6,126	3,445
8	142	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	Left Setback Levee	USACE Trench Foundation	88	6,698	3,766
8	143	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	Left Setback Levee	Borrow Excavation (< 1 Mile)	88	6,698	3,766
8	144	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	General				

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	145	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	General	Seeding (Levee Slopes)	88	6,698	3,766
8	146	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	General	Ramp & Turnabouts	88	6,698	3,766
8	147	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	General	Right Levee Aggregate Base Roadway	88	6,698	3,766
8	148	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	General	Left Levee Aggregate Base Roadway	88	6,698	3,766
8	149	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	General	Haul Excess Material By Truck (< 20 Miles, Drainage Channel)	88	6,698	3,766
8	150	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Levee Construction (Extension)	General	Mobilization	80	2,963	1,666
8	151	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Revetment					
8	152	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Revetment	Levee Revetment (4,600 Linear Feet)				
8	153	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Revetment	Levee Revetment (4,600 Linear Feet)	Mobilization & Demobilization (10%)	80	2,963	1,666
8	154	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Revetment	Levee Revetment (4,600 Linear Feet)	Clearing & Grubbing	87	6,126	3,445
8	155	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Revetment	Levee Revetment (4,600 Linear Feet)	Launch Rock	83	4,029	2,266
8	156	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Revetment	Levee Revetment (4,600 Linear Feet)	Rock Slope Protection	83	4,029	2,266
8	157	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Revetment	Levee Revetment (4,600 Linear Feet)	Clean Sand	83	4,029	2,266
8	158	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Revetment	Levee Revetment (4,600 Linear Feet)	Landscaping (Ag Soil, Plants, Etc)	82	3,544	1,993
8	159	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Revetment	Levee Revetment (4,600 Linear Feet)	Erosion Control	75	1,581	889
8	160	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Revetment	Levee Revetment (4,600 Linear Feet)	Environmental Mitigation (20% Of Subtotal)	75	1,581	889
8	161	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Revetment	Levee Revetment (4,600 Linear Feet)	Rock Slope - Labor	83	4,029	2,266
8	162	GROUP 7	Reach 2B Levee Extension FP-5	Levees	Revetment	Levee Revetment (4,600 Linear Feet)	Mobilization	80	2,963	1,666
8	163	GROUP 7	Reach 2B Levee Extension FP-5	Floodplain & Lands						
8	164	GROUP 7	Reach 2B Levee Extension FP-5	Floodplain & Lands	Levee Removal					
8	165	GROUP 7	Reach 2B Levee Extension FP-5	Floodplain & Lands	Levee Removal	Excavation Of Levee & Hauling Of Excess Material By Truck (< 20 Miles)		88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	166	GROUP 7	Reach 2B Levee Extension FP-5	Floodplain & Lands	Levee Removal	Mobilization		80	2,963	1,666
8	372	GROUP 8	Reach 2B							
8	373	GROUP 8	Reach 2B	Compact Alignment Fish Barrier						
8	374	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Clearing & Grubbing			87	6,126	3,445
8	375	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Sheet Pile Coffer Dams			103	38,638	21,728
8	376	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Sheet Pile Removal			103	38,638	21,728
8	377	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Dewatering			83	4,029	2,266
8	378	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Rock Riprap Approaches - Labor			83	4,029	2,266
8	380	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Site Excavation (Excludes Bypass Channel)			88	6,698	3,766
8	381	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Engineered Fill			88	6,698	3,766
8	382	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Transition Road Construction (6" AB)			88	6,698	3,766
8	383	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Structural Concrete			84	4,462	2,509
8	384	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	18" Concrete Piles (30' Deep)			103	38,638	21,728
8	385	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Concrete Pile Cap			83	4,029	2,266
8	386	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Bridge Appurtenances			83	4,029	2,266
8	387	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Trash Rack & Bar Rack/Fish Barrier			83	4,029	2,266
8	388	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Steel Monorail Supports			83	4,029	2,266
8	389	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Traffic Guard Railing			83	4,029	2,266
8	390	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Generator & Transformer			83	4,029	2,266
8	391	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Bosker Trash Rake/Hoist			83	4,029	2,266
8	392	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Access Gates			81	3,070	1,727
8	393	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Dust Control			79	2,376	1,336
8	394	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	SWPPP			75	1,581	889
8	395	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Worker Protection			82	3,529	1,984
8	396	GROUP 8	Reach 2B	Compact Alignment Fish Barrier	Mobilization			80	2,963	1,666

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	51	GROUP 10	Relocations	Relocations						
8	52	GROUP 10	Relocations	Relocations	Utilities					
8	53	GROUP 10	Relocations	Relocations	Utilities	Overhead Electrical Distribution Removal & Replacement		82	3,544	1,993
8	54	GROUP 10	Relocations	Relocations	Utilities	Mobilization		85	5,244	2,949
8	55	GROUP 10	Relocations	Relocations	Canal					
8	56	GROUP 10	Relocations	Relocations	Canal	Canal Relocations		85	5,113	2,875
8	57	GROUP 10	Relocations	Relocations	Canal	Mobilization		85	5,244	2,949
8	58	GROUP 10	Relocations	Relocations	Pump Station					
8	59	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)				
8	60	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Clearing & Grubbing	87	6,126	3,445
8	61	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Canal & Drain Relocation	86	5,460	3,070
8	62	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Concrete Lining (Intake & Outfall)	83	4,029	2,266
8	63	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Rock Riprap At Outfall	83	4,029	2,266
8	64	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Pump & Sump Relocation	82	3,544	1,993
8	65	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Replace Electrical Panel	81	3,070	1,727
8	66	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	PG&E Electrical Service	82	3,619	2,035
8	67	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	12" Steel Pipe	81	3,070	1,727

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	68	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Dust Control	82	3,529	1,984
8	69	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Worker Protection	80	2,963	1,666
8	70	GROUP 10	Relocations	Relocations	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Mobilization	85	5,244	2,949
8	72	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)				
8	73	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Clearing & Grubbing	85	4,742	2,666
8	74	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Reinforced Concrete Pipe (72" RGRCP D-50 Pipe)	83	4,029	2,266
8	75	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Pipe Trench Excavation (2:1 Side Slopes)	82	3,544	1,993
8	76	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Pipe Bedding (CLSM To Depth Of 0.375D, Cement Sand Slurry)	84	4,350	2,446
8	77	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Pipe Backfill & Compaction (6' Above Pipe)	85	4,742	2,666
8	78	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Outlet Structure	84	4,226	2,376
8	79	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Pipe Appurtenances	81	3,070	1,727
8	80	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Dust Control	78	2,236	1,257

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	81	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	SWPPP	81	3,155	1,774
8	82	GROUP 10	Relocations	Relocations	Pump Station	(38 CFS 72" Pipeline From Isolation Structure To Approx. City Of Mendota Well 7)	Worker Protection	78	2,118	1,191
8	83	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure				
8	84	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Clearing & Grubbing	87	6,126	3,445
8	85	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Pumps & Structure	80	2,963	1,666
8	86	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Coffer Dam	103	38,638	21,728
8	87	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Dewatering Within Coffer Dam	83	4,029	2,266
8	88	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Removal Of Existing Pumps & Pipeline	83	4,029	2,266
8	89	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Dust Control	79	2,376	1,336
8	90	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	SWPPP	75	1,581	889
8	91	GROUP 10	Relocations	Relocations	Pump Station	Lift Station - 38 CFS Near Isolation Structure	Worker Protection	82	3,529	1,984
8	93	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)				
8	94	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Clearing & Grubbing	86	5,912	3,325
8	95	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Reinforced Concrete Pipe (30" RGRCP D-50 Pipe)	83	4,029	2,266
8	96	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Pipe Trench Excavation (2:1 Side Slopes)	82	3,544	1,993
8	97	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Pipe Bedding (CLSM To Depth Of 0.375D, Cement Sand Slurry)	84	4,350	2,446
8	98	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Pipe Backfill & Compaction (6' Above Pipe)	85	4,742	2,666
8	99	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Pipe Appurtenances	81	3,070	1,727
8	100	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Dust Control	78	2,236	1,257

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	101	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	SWPPP	81	3,155	1,774
8	102	GROUP 10	Relocations	Relocations	Pump Station	(22 CFS 30" Pipeline At Well 7 To Existing Mowry Ranch Pipeline)	Worker Protection	85	5,244	2,949
8	104	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)				
8	105	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Clearing & Grubbing	84	4,462	2,509
8	106	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Reinforced Concrete Pipe (24" RGRCP D-50 Pipe)	83	4,029	2,266
8	107	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Pipe Trench Excavation (2:1 Side Slopes)	82	3,544	1,993
8	108	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Pipe Bedding (CLSM To Depth Of 0.375D, Cement Sand Slurry)	84	4,350	2,446
8	109	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Pipe Backfill & Compaction (6' Above Pipe)	85	4,742	2,666
8	110	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Pipe Appurtenances	81	3,070	1,727
8	111	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Dust Control	78	2,236	1,257
8	112	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	SWPPP	81	3,155	1,774
8	113	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Worker Protection	80	2,963	1,666
8	114	GROUP 10	Relocations	Relocations	Pump Station	(16 CFS 24" Pipeline From Well 7 To Approx. Well 9)	Mobilization	78	2,118	1,191
8	116	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)				
8	117	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Clearing & Grubbing	87	6,126	3,445
8	118	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Earthwork (Loader & Truck)	88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	119	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Revegetation	88	6,698	3,766
8	120	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Pull Pump & Column & Install After Modifications	83	4,029	2,266
8	121	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Column Extension	83	4,029	2,266
8	122	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Casing Extension	83	4,029	2,266
8	123	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Discharge Pipe Modifications	83	4,029	2,266
8	124	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Replace Electrical Panel	81	3,070	1,727
8	125	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	PG&E Electrical Service	81	3,070	1,727
8	126	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Dust Control	79	2,376	1,336
8	127	GROUP 10	Relocations	Relocations	Pump Station	Site Preparation & Construction (2 Each Locations)	Mobilization	80	2,963	1,666
8	230	GROUP 11	Columbia Canal Company Relocation Facilities							
8	231	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS						
8	232	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Clearing & Grubbing			87	6,126	3,445
8	233	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Site Excavation			88	6,698	3,766
8	234	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Structure Backfill			88	6,698	3,766
8	235	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Structure Concrete			83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	236	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Pumps & Motors (50 HP)			83	4,029	2,266
8	237	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Pump & Motor With VFD & Appurtenances (50 HP)			83	4,029	2,266
8	238	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Pumps & Motors (75 HP)			83	4,029	2,266
8	239	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Pump & Motor With VFD & Appurtenances (75 HP)			83	4,029	2,266
8	240	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Pump Control Building (16'x8')			80	2,963	1,666
8	241	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	72" Steel Pipe			84	4,462	2,509
8	242	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	36" Pump Discharge Assemblies			80	2,963	1,666
8	243	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Trashrack			83	4,029	2,266
8	244	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Miscellaneous Metals			83	4,029	2,266
8	245	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Excavate Ditch To Connect Pump Inlet To River Thalweg			88	6,698	3,766
8	246	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Flow Meter (Ultrasonic In Each Pipe Within Concrete Vault)			84	4,462	2,509
8	247	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Coffer Dam			103	38,638	21,728

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	248	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Dewatering Within Coffer Dam			83	4,029	2,266
8	249	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Dust Control			79	2,376	1,336
8	250	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	SWPPP			75	1,581	889
8	251	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant - 250 CFS	Worker Protection			82	3,529	1,984
8	252	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)						
8	253	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Clearing & Grubbing			87	6,126	3,445
8	254	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Reinforced Concrete Pipe (RCP) - Two 72" D-50 Pipes			83	4,029	2,266
8	255	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Reinforced Concrete Pipe (RCP) - 72" Bends			83	4,029	2,266
8	256	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Pipe Trench Excavation (2:1 Side Slopes)			83	4,029	2,266
8	257	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Pipe Bedding (CLSM To Depth Of 0.5D, Cement Sand Slurry)			81	3,070	1,727
8	258	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Pipe Backfill & Compaction (15' Above Pipe)			86	5,320	2,992
8	259	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Dust Control			79	2,376	1,336

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	260	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	SWPPP			75	1,581	889
8	261	GROUP 11	Columbia Canal Company Relocation Facilities	Siphon Under Compact Alignment (From Flow Meter To Outlet)	Worker Protection			82	3,529	1,984
8	262	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures						
8	263	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Clearing & Grubbing			87	6,126	3,445
8	264	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Structure Backfill			88	6,698	3,766
8	265	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Structure Concrete (Check Structure & Headwalls)			83	4,029	2,266
8	266	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	72" Gate			83	4,029	2,266
8	267	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Riprap Facing Class Purchase, 100 LB/CF, 2' Deep			83	4,029	2,266
8	268	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Rock Riprap Approaches / Outfalls & Side Slope Protection, 2' Deep			83	4,029	2,266
8	269	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Dust Control			79	2,376	1,336
8	270	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	SWPPP			75	1,581	889
8	271	GROUP 11	Columbia Canal Company Relocation Facilities	USBR Main Columbia Pumping Plant Outlet Structures	Worker Protection			82	3,529	1,984

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	272	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks						
8	273	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Clearing & Grubbing			87	6,126	3,445
8	274	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Demolish Old Pump Structure, Flume, & Disposal			87	6,126	3,445
8	275	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Onsite Excavation			88	6,698	3,766
8	276	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Loader / Excavator & Truck For Material (Compacted Vol + 20%)			88	6,698	3,766
8	277	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Haul Truck (Less Than 20 Miles, Compacted Vol + 20%)			88	6,698	3,766
8	278	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Earthwork Fill & Compaction			88	6,698	3,766
8	279	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Canal Lining At 6" Thick			83	4,029	2,266
8	280	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Purchasing & Hauling Gravel For Roadway, 100 LB/CF			86	5,617	3,159
8	281	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Gravel Placement For New Road At 6" Thick, 4,000 LF On Both Banks			88	6,698	3,766
8	282	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Structure Concrete (Check Structure)			83	4,029	2,266
8	283	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Dust Control			79	2,376	1,336

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	284	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	SWPPP			75	1,581	889
8	285	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Worker Protection			82	3,529	1,984
8	286	GROUP 11	Columbia Canal Company Relocation Facilities	Raising Columbia Canal 5' From Proposed Headworks Back To Old Headworks	Mobilization			80	2,963	1,666
8	435	GROUP 12	Relocations SJR Bypass Canal South Option							
8	436	GROUP 12	Relocations SJR Bypass Canal South Option	Canal						
8	437	GROUP 12	Relocations SJR Bypass Canal South Option	Canal	Canal Relocations			88	6,698	3,766
8	438	GROUP 12	Relocations SJR Bypass Canal South Option	Canal	Mobilization			80	2,963	1,666
8	439	GROUP 12	Relocations SJR Bypass Canal South Option	Utilities						
8	440	GROUP 12	Relocations SJR Bypass Canal South Option	Utilities	Overhead Electrical Distribution Removal & Replacement			83	4,029	2,266
8	441	GROUP 12	Relocations SJR Bypass Canal South Option	Utilities	Mobilization			80	2,963	1,666
8	442	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station						
8	443	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)					
8	444	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Clearing & Grubbing		87	6,126	3,445
8	445	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Canal/Drain Relocation		88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	446	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Concrete Lining (Intake & Outfall)		83	4,029	2,266
8	447	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Rock Riprap At Outfall		83	4,029	2,266
8	448	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Pump & Sump Relocation		83	4,029	2,266
8	449	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Replace Electrical Panel		81	3,070	1,727
8	450	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	PG&E Electrical Service		81	3,070	1,727
8	451	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	12" Steel Pipe		83	4,029	2,266
8	452	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Dust Control		79	2,376	1,336
8	453	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Worker Protection		82	3,529	1,984
8	454	GROUP 12	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Mobilization		80	2,963	1,666
8	455	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing						
8	456	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)					
8	457	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Clearing & Grubbing		87	6,126	3,445
8	458	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Earthwork (Loader & Truck)		88	6,698	3,766
8	459	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Revegetation		88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	460	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Pull Pump & Column and Reinstall After Modifications		83	4,029	2,266
8	461	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Column Extension		83	4,029	2,266
8	462	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Casing Extension		83	4,029	2,266
8	463	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Discharge Pipe Modifications		83	4,029	2,266
8	464	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Replace Electrical Panel		81	3,070	1,727
8	465	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	PG&E Electrical Service		81	3,070	1,727
8	466	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Dust Control		79	2,376	1,336
8	467	GROUP 12	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Mobilization		80	2,963	1,666
8	320	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure						
8	321	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Concrete			83	4,029	2,266
8	322	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Reinforcing Steel			83	4,029	2,266
8	323	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Steel Grating			83	4,029	2,266
8	324	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Steel Slide Compression Gate			83	4,029	2,266
8	325	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Adjustable Steel Slot Weir			83	4,029	2,266
8	326	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Steel Slide Compression Gate for Pipe Diversion			83	4,029	2,266
8	327	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Steel Slide Compression Gate for Supplim. Flow Pipe			83	4,029	2,266
8	328	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Fish Screen			83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	329	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Trash Rack			83	4,029	2,266
8	330	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Automated Trash Rack Screen Cleaner			83	4,029	2,266
8	331	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Steel Slide Gate Operator Control			83	4,029	2,266
8	332	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	60" Diameter Steel Pipe			83	4,029	2,266
8	333	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	84" Diameter Steel Pipe			84	4,462	2,509
8	334	GROUP 13	Fish Ladder and Supplemental Intake Structure	Fish Ladder and Supplemental Intake Structure	Mobilization			80	2,963	1,666
8	468	GROUP 14	Fresno Slough Dam							
8	469	GROUP 14	Fresno Slough Dam	SJR Control Structure						
8	470	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment					
8	471	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Clearing & Grubbing		87	6,126	3,445
8	472	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Cofferdam		103	38,638	21,728
8	473	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Cofferdam Removal		103	38,638	21,728
8	474	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
8	475	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Dewatering		83	4,029	2,266
8	476	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Excavation To Stockpile		88	6,698	3,766
8	477	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Excavation To Disposal Off Site		88	6,698	3,766
8	478	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Gravel Base		88	6,698	3,766
8	479	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure					

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	480	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	12" Square Concrete Piles		103	38,638	21,728
8	481	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Concrete		83	4,029	2,266
8	482	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Reinforcing Steel		83	4,029	2,266
8	483	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Carbon/Galvanized Steel		83	4,029	2,266
8	484	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Stainless Steel		83	4,029	2,266
8	485	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Pipe Handrail		83	4,029	2,266
8	486	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Guardrail		83	4,029	2,266
8	487	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates					
8	488	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Tainter Gate Steel		83	4,029	2,266
8	489	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Motor Operated Hoist W/Wire Ropes		83	4,029	2,266
8	490	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trash Rack - Miscellaneous Steel		83	4,029	2,266
8	491	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trash Rack - Stainless Steel		83	4,029	2,266
8	492	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trash Rack - Nelson Studs		83	4,029	2,266
8	493	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trashrake Units		83	4,029	2,266
8	494	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trashrake - Structure Support Steel		83	4,029	2,266
8	495	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Rock Slope Protection		83	4,029	2,266
8	496	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment					
8	497	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Compacted Embankment - From Stockpile		88	6,698	3,766
8	498	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Compacted Embankment - Core Material		88	6,698	3,766
8	499	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Geotextile Fabric		80	2,963	1,666
8	500	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	9" Bedding		84	4,337	2,439
8	501	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Stone Slope Protection, Type 1		83	4,029	2,266
8	502	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection	Access Road (4" AC / 6" AB, 24' Wide)		88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
					Embankment					
8	503	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Chain Link Fence W/Barbed Wire		80	2,963	1,666
8	504	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Automatic Entrance Gate		81	3,070	1,727
8	505	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment					
8	506	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Compacted Embankment From Stockpile		88	6,698	3,766
8	507	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Compacted Embankment - Core Material		88	6,698	3,766
8	508	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Geotextile Fabric		80	2,963	1,666
8	509	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	9" Bedding		84	4,337	2,439
8	510	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Stone Slope Protection, Type 1		83	4,029	2,266
8	511	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Access Road (4" AC / 6" AB, 24' Wide)		88	6,698	3,766
8	512	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Chain Link Fence W/Barbed Wire		80	2,963	1,666
8	513	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Automatic Entrance Gate		81	3,070	1,727
8	514	GROUP 14	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Mobilization		80	2,963	1,666
8	515	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation					
8	516	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Clearing & Grubbing		87	6,126	3,445
8	517	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Cofferdam		103	38,638	21,728
8	518	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Cofferdam Removal		103	38,638	21,728
8	519	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
8	520	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Dewatering		83	4,029	2,266
8	521	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Excavation To Stockpile		88	6,698	3,766
8	522	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Excavation To Disposal Off Site		88	6,698	3,766
8	523	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Gravel Base		88	6,698	3,766
8	524	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure					
8	525	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Concrete		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	526	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Reinforcing Steel		83	4,029	2,266
8	527	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Grating		83	4,029	2,266
8	528	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate		83	4,029	2,266
8	529	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Adjustable Steel Slot Weir		83	4,029	2,266
8	530	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate for Pipe Diversion		83	4,029	2,266
8	531	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate for Supplim. Flow Pipe		83	4,029	2,266
8	532	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Fish Screen		83	4,029	2,266
8	533	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Trash Rack		83	4,029	2,266
8	534	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Automated Trash Rack Screen Cleaner		83	4,029	2,266
8	535	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Slide Gate Operator Control		81	3,070	1,727
8	536	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	60" Steel Pipe		83	4,029	2,266
8	537	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	84" Steel Pipe		83	4,029	2,266
8	538	GROUP 14	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Mobilization		80	2,963	1,666
8	539	GROUP 15	Fresno Slough Dam							
8	540	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen						
8	541	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork					
8	542	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Clearing & Grubbing		87	6,126	3,445

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	543	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Cofferdam		103	38,638	21,728
8	544	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Cofferdam Removal		103	38,638	21,728
8	545	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
8	546	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Dewatering		83	4,029	2,266
8	547	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Excavation To Stockpile		88	6,698	3,766
8	548	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Excavation To Disposal Off Site		88	6,698	3,766
8	549	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Gravel Base		88	6,698	3,766
8	550	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure					
8	551	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Concrete		83	4,029	2,266
8	552	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Reinforcing Steel		83	4,029	2,266
8	553	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Miscellaneous Metals		83	4,029	2,266
8	554	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Steel Members		83	4,029	2,266
8	555	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Fish Screen		83	4,029	2,266
8	556	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Adjustable Baffles		83	4,029	2,266
8	557	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Automated Screen Brush Cleaners		83	4,029	2,266
8	558	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Scour Protection		83	4,029	2,266
8	559	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Electric Winches For Vertical Slide Gates		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	560	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen					
8	561	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Compacted Embankment - From Stockpile		88	6,698	3,766
8	562	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Compacted Embankment - Core Material		88	6,698	3,766
8	563	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Geotextile Fabric		80	2,963	1,666
8	564	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	9" Bedding		84	4,337	2,439
8	565	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Stone Slope Protection, Type 1		83	4,029	2,266
8	566	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Access Road (4" AC / 6" AB, 24' Wide)		88	6,698	3,766
8	567	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Chain Link Fence W/Barbed Wire		80	2,963	1,666
8	568	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Automatic Entrance Gate		81	3,070	1,727
8	569	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure					
8	570	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure	Concrete		83	4,029	2,266
8	571	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure	Reinforcing Steel		83	4,029	2,266
8	572	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure	48" Steel Pipe		83	4,029	2,266
8	573	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure	Mobilization		80	2,963	1,666
8	574	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure					
8	575	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Clearing & Grubbing		87	6,126	3,445
8	576	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Excavation To Stockpile		88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	577	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Excavation To Disposal Off Site		88	6,698	3,766
8	578	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
8	579	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure					
8	580	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	12" Square Concrete Piles		103	38,638	21,728
8	581	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Concrete		83	4,029	2,266
8	582	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Reinforcing Steel		83	4,029	2,266
8	583	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Carbon/Galvanized Steel		83	4,029	2,266
8	584	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Stainless Steel		83	4,029	2,266
8	585	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Pipe Handrail		83	4,029	2,266
8	586	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Guardrail		83	4,029	2,266
8	587	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates					
8	588	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Tainter Gate Steel		83	4,029	2,266
8	589	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Motor Operated Hoist W/Wire Ropes		83	4,029	2,266
8	590	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trash Rack - Miscellaneous Steel		83	4,029	2,266
8	591	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trash Rack - Stainless Steel		83	4,029	2,266
8	592	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trash Rack - Nelson Suds		83	4,029	2,266
8	593	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trashrake Units		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	594	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trashrake - Structural Support Steel		83	4,029	2,266
8	595	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Rock Slope Protection		83	4,029	2,266
8	596	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments					
8	597	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Compacted Embankment - From Stockpile		88	6,698	3,766
8	598	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Compacted Embankment - Core Material		88	6,698	3,766
8	599	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Access Road (4" AC / 6" AB, 24' Wide)		88	6,698	3,766
8	600	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Chain Link Fence W/Barbed Wire		80	2,963	1,666
8	601	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Automated Entrance Gate		81	3,070	1,727
8	602	GROUP 15	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Mobilization		80	2,963	1,666
8	167	GROUP 16	Vegetation & Irrigation							
8	168	GROUP 16	Vegetation & Irrigation	General Description						
8	169	GROUP 16	Vegetation & Irrigation	General Description	Plant Establishment (12 Months)			81	3,070	1,727
8	170	GROUP 16	Vegetation & Irrigation	General Description	Landscape Maintenance (12 Months Or As Needed)			81	3,070	1,727
8	171	GROUP 16	Vegetation & Irrigation	General Description	Agricultural Topsoil (6" Layer)			88	6,698	3,766
8	172	GROUP 16	Vegetation & Irrigation	General Description	Erosion Control Fabric			80	2,963	1,666
8	173	GROUP 16	Vegetation & Irrigation	General Description	Irrigation System			81	3,070	1,727
8	174	GROUP 16	Vegetation & Irrigation	General Description	Beaver Fence			80	2,963	1,666
8	175	GROUP 16	Vegetation & Irrigation	General Description	Seeding			88	6,698	3,766
8	176	GROUP 16	Vegetation & Irrigation	General Description	Pole Cuttings			80	2,963	1,666
8	177	GROUP 16	Vegetation & Irrigation	General Description	Fascine Bundle			80	2,963	1,666

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
8	178	GROUP 16	Vegetation & Irrigation	General Description	Instream Woody Material			80	2,963	1,666
8	182	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation T4 - Cbm			81	3,070	1,727
8	183	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation DP - Cmb			81	3,070	1,727
8	184	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation DP - Crg			81	3,070	1,727
8	185	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation DP - Rbh			81	3,070	1,727
8	186	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation DP - Sgf			81	3,070	1,727
8	189	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation D6 - Swt			81	3,070	1,727
8	190	GROUP 16	Vegetation & Irrigation	General Description	Treepot Installation D6 - Bwt			81	3,070	1,727
8	191	GROUP 16	Vegetation & Irrigation	General Description	Mobilization			80	2,963	1,666
9	1	GROUP 1	Levee Construction							
9	2	GROUP 1	Levee Construction	Levee Preparation						
9	3	GROUP 1	Levee Construction	Levee Preparation	Clearing & Grubbing			87	6,126	3,445
9	4	GROUP 1	Levee Construction	Levee Preparation	Tree Removal			87	6,126	3,445
9	5	GROUP 1	Levee Construction	Right Setback Levee						
9	6	GROUP 1	Levee Construction	Right Setback Levee	Compacted Embankment			88	6,698	3,766
9	7	GROUP 1	Levee Construction	Right Setback Levee	Slurry Wall (100 Percent Of Total Levee Length)			87	6,126	3,445
9	8	GROUP 1	Levee Construction	Right Setback Levee	USACE Trench Foundation			88	6,698	3,766
9	9	GROUP 1	Levee Construction	Right Setback Levee	Borrow Excavation (< 1 Mile)			88	6,698	3,766
9	10	GROUP 1	Levee Construction	Left Setback Levee						
9	11	GROUP 1	Levee Construction	Left Setback Levee	Compacted Embankment			88	6,698	3,766
9	12	GROUP 1	Levee Construction	Left Setback Levee	Slurry Wall (100 Percent Of Total Levee Length)			87	6,126	3,445
9	13	GROUP 1	Levee Construction	Left Setback Levee	USACE Trench Foundation			88	6,698	3,766
9	14	GROUP 1	Levee Construction	Left Setback Levee	Borrow Excavation (< 1 Mile)			88	6,698	3,766
9	15	GROUP 1	Levee Construction	General						
9	16	GROUP 1	Levee Construction	General	Seeding (Levee Slopes)			88	6,698	3,766
9	17	GROUP 1	Levee Construction	General	Ramps & Turnabouts			88	6,698	3,766
9	18	GROUP 1	Levee Construction	General	Right Levee Aggregate Base Roadway			88	6,698	3,766
9	19	GROUP 1	Levee Construction	General	Left Levee Aggregate Base Roadway			88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	20	GROUP 1	Levee Construction	General	Haul Excess Material By Truck <20 Miles (Drainage Channel)			88	6,698	3,766
9	21	GROUP 1	Levee Construction	General	Mobilization			80	2,963	1,666
9	35	GROUP 2	Levee Removal							
9	36	GROUP 2	Levee Removal	Excavation of Levee and Haul Excess Material By Truck <20 Miles				88	6,698	3,766
9	37	GROUP 2	Levee Removal	Mobilization				80	2,963	1,666
9	33	GROUP 3	Levee Revetment	Revetment Per Linear Foot	Rock Slope - Labor	Revetment Subtotal Per Linear Foot (Subtotal 24 To 33)		87	6,126	3,445
9	34	GROUP 3	Levee Revetment	Revetment Per Linear Foot	Mobilization			80	2,963	1,666
9	84	GROUP 4	Fresno Slough Dam							
9	85	GROUP 4	Fresno Slough Dam	Initial Stage						
9	86	GROUP 4	Fresno Slough Dam	Initial Stage	Clearing & Grubbing			87	6,126	3,445
9	87	GROUP 4	Fresno Slough Dam	Initial Stage	Soil Remediation			88	6,698	3,766
9	88	GROUP 4	Fresno Slough Dam	Initial Stage	Cut-Off Wall (Secant Piles)			84	4,462	2,509
9	89	GROUP 4	Fresno Slough Dam	Initial Stage	Upstream Right Bank Excavation			88	6,698	3,766
9	90	GROUP 4	Fresno Slough Dam	Stage 1 - Dam Spillway Structure						
9	91	GROUP 4	Fresno Slough Dam	Stage 1 - Dam Spillway Structure	Cofferdam			103	38,638	21,728
9	92	GROUP 4	Fresno Slough Dam	Stage 1 - Dam Spillway Structure	Cofferdam Removal			103	38,638	21,728
9	93	GROUP 4	Fresno Slough Dam	Stage 1 - Dam Spillway Structure	Dewatering			83	4,029	2,266
9	94	GROUP 4	Fresno Slough Dam	Stage 1 - Dam Spillway Structure	Excavation To Stockpile			88	6,698	3,766
9	95	GROUP 4	Fresno Slough Dam	Stage 1 - Dam Spillway Structure	Excavation To Disposal Off Site			88	6,698	3,766
9	96	GROUP 4	Fresno Slough Dam	Stage 1 - Dam Spillway Structure	Tremie Concrete			83	4,029	2,266
9	97	GROUP 4	Fresno Slough Dam	Stage 1 - Dam Spillway Structure	Gravel			88	6,698	3,766
9	98	GROUP 4	Fresno Slough Dam	Stage 1 - Dam Spillway Structure	Concrete			83	4,029	2,266
9	99	GROUP 4	Fresno Slough Dam	Stage 1 - Dam Spillway Structure	Reinforcing Steel			83	4,029	2,266
9	100	GROUP 4	Fresno Slough Dam	Stage 1 - Dam Spillway Structure	Guardrail			83	4,029	2,266
9	101	GROUP 4	Fresno Slough Dam	Radial Gates (Spillway Structure)						
9	102	GROUP 4	Fresno Slough Dam	Radial Gates (Spillway Structure)	Radial Gates			83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	103	GROUP 4	Fresno Slough Dam	Radial Gates (Spillway Structure)	Motor Operated Hoist W/Wire Ropes			83	4,029	2,266
9	104	GROUP 4	Fresno Slough Dam	Radial Gates (Spillway Structure)	Embedded Metal (Stainless Steel)			83	4,029	2,266
9	105	GROUP 4	Fresno Slough Dam	Radial Gates (Spillway Structure)	Railing			83	4,029	2,266
9	106	GROUP 4	Fresno Slough Dam	Radial Gates (Spillway Structure)	Riprap			83	4,029	2,266
9	107	GROUP 4	Fresno Slough Dam	Radial Gates (Spillway Structure)	Stoplog			83	4,029	2,266
9	108	GROUP 4	Fresno Slough Dam	Radial Gates (Spillway Structure)	Water Velocity & Flow Measuring System			81	3,070	1,727
9	109	GROUP 4	Fresno Slough Dam	Radial Gates (Spillway Structure)	Propane Tank & Enclosure			80	2,963	1,666
9	110	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left						
9	111	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Cofferdam			103	38,638	21,728
9	112	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Cofferdam Removal			103	38,638	21,728
9	113	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Dewatering			83	4,029	2,266
9	114	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Excavation To Stockpile			88	6,698	3,766
9	115	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Excavation To Disposal Off Site			88	6,698	3,766
9	116	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Tremie Concrete			83	4,029	2,266
9	117	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Gravel			88	6,698	3,766
9	118	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Compacted Embankment - From Stockpile			88	6,698	3,766
9	119	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Compacted Embankment - Core Material			88	6,698	3,766
9	120	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Geotextile Fabric			80	2,963	1,666
9	121	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	9" Bedding			84	4,337	2,439
9	122	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Stone Slope Protection, Type 1			83	4,029	2,266
9	123	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Access Road (4" AC / 6" AB, 24' Wide)			88	6,698	3,766
9	124	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Chain Link Fence W/Barbed Wire			80	2,963	1,666
9	125	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Pipe Handrail			83	4,029	2,266
9	126	GROUP 4	Fresno Slough Dam	Stage 2 - Earthen Embankment Left	Automatic Entrance Gate			81	3,070	1,727

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	127	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right						
9	128	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Cofferdam			103	38,638	21,728
9	129	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Cofferdam Removal			103	38,638	21,728
9	130	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Dewatering			83	4,029	2,266
9	131	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Excavation To Stockpile			88	6,698	3,766
9	132	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Excavation To Disposal Off Site			88	6,698	3,766
9	133	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Tremie Concrete			83	4,029	2,266
9	134	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Gravel			88	6,698	3,766
9	135	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Compacted Embankment - From Stockpile			88	6,698	3,766
9	136	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Compacted Embankment - Imported			88	6,698	3,766
9	137	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Compacted Embankment - Core Material			88	6,698	3,766
9	138	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Geotextile Fabric			80	2,963	1,666
9	139	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	9" Bedding			84	4,337	2,439
9	140	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Stone Slope Protection, Type 1			83	4,029	2,266
9	141	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Access Road (4" AC / 6" AB, 24' Wide)			88	6,698	3,766
9	142	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Chain Link Fence W/Barbed Wire			80	2,963	1,666
9	143	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Pipe Handrail			83	4,029	2,266
9	144	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Automatic Entrance Gate			81	3,070	1,727
9	145	GROUP 4	Fresno Slough Dam	Stage 3 - Earthen Embankment Right	Mobilization			80	2,963	1,666
9	172	GROUP 5	Fresno Slough Dam							
9	173	GROUP 5	Fresno Slough Dam	SJR Control Structure						
9	174	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment					
9	175	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Clearing & Grubbing		87	6,126	3,445

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	176	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Cofferdam		103	38,638	21,728
9	177	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Cofferdam Removal		103	38,638	21,728
9	178	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
9	179	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Dewatering		83	4,029	2,266
9	180	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Excavation To Stockpile		88	6,698	3,766
9	181	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Excavation To Disposal Off Site		88	6,698	3,766
9	182	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control & 1/2 Connection Embankment	Gravel Base		88	6,698	3,766
9	183	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure					
9	184	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	12" Square Concrete Piles		103	38,638	21,728
9	185	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Concrete		83	4,029	2,266
9	186	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Reinforcing Steel		83	4,029	2,266
9	187	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Carbon/Galvanized Steel		83	4,029	2,266
9	188	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Stainless Steel		83	4,029	2,266
9	189	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Pipe Handrail		83	4,029	2,266
9	190	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Structure	Guardrail		83	4,029	2,266
9	191	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates					
9	192	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Tainter Gate Steel		83	4,029	2,266
9	193	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Motor Operated Hoist W/Wire Ropes		83	4,029	2,266
9	194	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trash Rack - Miscellaneous Steel		83	4,029	2,266
9	195	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trash Rack - Stainless Steel		83	4,029	2,266
9	196	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trash Rack - Nelson Studs		83	4,029	2,266
9	197	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trashrake Units		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	198	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Trashrake - Structure Support Steel		83	4,029	2,266
9	199	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - SJR Control Radial Gates	Rock Slope Protection		83	4,029	2,266
9	200	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment					
9	201	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Compacted Embankment - From Stockpile		88	6,698	3,766
9	202	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Compacted Embankment - Core Material		88	6,698	3,766
9	203	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Geotextile Fabric		80	2,963	1,666
9	204	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	9" Bedding		84	4,337	2,439
9	205	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Stone Slope Protection, Type 1		83	4,029	2,266
9	206	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Access Road (4" AC / 6" AB, 24' Wide)		88	6,698	3,766
9	207	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Chain Link Fence W/Barbed Wire		80	2,963	1,666
9	208	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 1 - 1/2 Connection Embankment	Automatic Entrance Gate		81	3,070	1,727
9	209	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment					
9	210	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Compacted Embankment From Stockpile		88	6,698	3,766
9	211	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Compacted Embankment - Core Material		88	6,698	3,766
9	212	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Geotextile Fabric		80	2,963	1,666
9	213	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	9" Bedding		84	4,337	2,439
9	214	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Stone Slope Protection, Type 1		83	4,029	2,266
9	215	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Access Road (4" AC / 6" AB, 24' Wide)		88	6,698	3,766
9	216	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Chain Link Fence W/Barbed Wire		80	2,963	1,666
9	217	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Automatic Entrance Gate		81	3,070	1,727
9	218	GROUP 5	Fresno Slough Dam	SJR Control Structure	Stage 2 - Wing Embankment	Mobilization		80	2,963	1,666

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	219	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation					
9	220	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Clearing & Grubbing		87	6,126	3,445
9	221	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Cofferdam		103	38,638	21,728
9	222	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Cofferdam Removal		103	38,638	21,728
9	223	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
9	224	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Dewatering		83	4,029	2,266
9	225	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Excavation To Stockpile		88	6,698	3,766
9	226	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Excavation To Disposal Off Site		88	6,698	3,766
9	227	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder Preparation	Gravel Base		88	6,698	3,766
9	229	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Concrete		83	4,029	2,266
9	230	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Reinforcing Steel		83	4,029	2,266
9	231	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Grating		83	4,029	2,266
9	232	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate		83	4,029	2,266
9	233	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Adjustable Steel Slot Weir		83	4,029	2,266
9	234	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate for Pipe Diversion		83	4,029	2,266
9	235	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Slide Compression Gate for Supplim. Flow Pipe		83	4,029	2,266
9	236	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Fish Screen		83	4,029	2,266
9	237	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Trash Rack		83	4,029	2,266
9	238	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Automated Trash Rack Screen Cleaner		83	4,029	2,266
9	239	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Steel Slide Gate Operator Control		81	3,070	1,727
9	240	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	60" Steel Pipe		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	241	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	84" Steel Pipe		83	4,029	2,266
9	242	GROUP 5	Fresno Slough Dam	SJR Control Structure	Fish Ladder & Supplemental Intake Structure	Mobilization		80	2,963	1,666
9	243	GROUP 6	Fresno Slough Dam							
9	244	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen						
9	245	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork					
9	246	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Clearing & Grubbing		87	6,126	3,445
9	247	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Cofferdam		103	38,638	21,728
9	248	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Cofferdam Removal		103	38,638	21,728
9	249	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
9	250	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Dewatering		83	4,029	2,266
9	251	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Excavation To Stockpile		88	6,698	3,766
9	252	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Excavation To Disposal Off Site		88	6,698	3,766
9	253	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Earthwork	Gravel Base		88	6,698	3,766
9	254	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure					
9	255	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Concrete		83	4,029	2,266
9	256	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Reinforcing Steel		83	4,029	2,266
9	257	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Miscellaneous Metals		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	258	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Steel Members		83	4,029	2,266
9	259	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Fish Screen		83	4,029	2,266
9	260	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Adjustable Baffles		83	4,029	2,266
9	261	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Automated Screen Brush Cleaners		83	4,029	2,266
9	262	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Scour Protection		83	4,029	2,266
9	263	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Structure	Electric Winches For Vertical Slide Gates		83	4,029	2,266
9	264	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen					
9	265	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Compacted Embankment - From Stockpile		88	6,698	3,766
9	266	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Compacted Embankment - Core Material		88	6,698	3,766
9	267	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Geotextile Fabric		80	2,963	1,666
9	268	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	9" Bedding		84	4,337	2,439
9	269	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Stone Slope Protection, Type 1		83	4,029	2,266
9	270	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Access Road (4" AC / 6" AB, 24' Wide)		88	6,698	3,766
9	271	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Chain Link Fence W/Barbed Wire		80	2,963	1,666
9	272	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Connection Embankments For Fish Screen	Automatic Entrance Gate		81	3,070	1,727
9	273	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure					
9	274	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure	Concrete		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	275	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure	Reinforcing Steel		83	4,029	2,266
9	276	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure	48" Steel Pipe		83	4,029	2,266
9	277	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Fish Screen Outlet Structure	Mobilization		80	2,963	1,666
9	278	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure					
9	279	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Clearing & Grubbing		87	6,126	3,445
9	280	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Excavation To Stockpile		88	6,698	3,766
9	281	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Excavation To Disposal Off Site		88	6,698	3,766
9	282	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Cut-Off Wall (Sheet Piles)		103	38,638	21,728
9	283	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure					
9	284	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	12" Square Concrete Piles		103	38,638	21,728
9	285	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Concrete		83	4,029	2,266
9	286	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Reinforcing Steel		83	4,029	2,266
9	287	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Carbon/Galvanized Steel		83	4,029	2,266
9	288	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Stainless Steel		83	4,029	2,266
9	289	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Pipe Handrail		83	4,029	2,266
9	290	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Channel Control Structure	Guardrail		83	4,029	2,266
9	291	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates					

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	292	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Tainter Gate Steel		83	4,029	2,266
9	293	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Motor Operated Hoist W/Wire Ropes		83	4,029	2,266
9	294	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trash Rack - Miscellaneous Steel		83	4,029	2,266
9	295	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trash Rack - Stainless Steel		83	4,029	2,266
9	296	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trash Rack - Nelson Suds		83	4,029	2,266
9	297	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trashrake Units		83	4,029	2,266
9	298	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Trashrake - Structural Support Steel		83	4,029	2,266
9	299	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Radial Gates	Rock Slope Protection		83	4,029	2,266
9	300	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments					
9	301	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Compacted Embankment - From Stockpile		88	6,698	3,766
9	302	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Compacted Embankment - Core Material		88	6,698	3,766
9	303	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Access Road (4" AC / 6" AB, 24' Wide)		88	6,698	3,766
9	304	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Chain Link Fence W/Barbed Wire		80	2,963	1,666
9	305	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Automated Entrance Gate		81	3,070	1,727
9	306	GROUP 6	Fresno Slough Dam	Bypass Canal - North & South Options Fish Screen	Bypass Control Embankments	Mobilization		80	2,963	1,666
9	146	GROUP 7	Fresno Slough Dam							
9	147	GROUP 7	Fresno Slough Dam	Channel Excavation						
9	148	GROUP 7	Fresno Slough Dam	Channel Excavation	Excavation (Bulldozer)			88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	149	GROUP 7	Fresno Slough Dam	Channel Excavation	Excavation & Haul Material By Truck (<20 Miles)			88	6,698	3,766
9	150	GROUP 7	Fresno Slough Dam	Channel Excavation	Mobilization			80	2,963	1,666
9	151	GROUP 8	Fresno Slough Dam							
9	152	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined						
9	153	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General					
9	154	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General	Clearing & Grubbing		87	6,126	3,445
9	155	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General	Water For Dust Abatement		79	2,376	1,336
9	156	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General	SWPPP		75	1,581	889
9	157	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General	Worker Protection		82	3,529	1,984
9	158	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General	Bridge (30'x165')		83	4,029	2,266
9	159	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	General	Bridge Appurtenances		83	4,029	2,266
9	160	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Canal Excavation					
9	161	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Canal Excavation	Course Canal Excavation (Loader & Dozer)		88	6,698	3,766
9	162	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Canal Excavation	Haul Off Site (<20 Miles, Main Canal)		88	6,698	3,766
9	163	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Canal Excavation	Concrete Liner @ 6" Thick		84	4,462	2,509
9	164	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Canal Excavation	Riprap Approach (25' x bottom Canal Width)		83	4,029	2,266
9	165	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)					
9	166	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)	Compacted Embankment		88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	167	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)	Inspection Trench (20% Of Levee Length)		88	6,698	3,766
9	168	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)	Seeding (Levee Slopes)		88	6,698	3,766
9	169	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)	Ramps & Turnabouts		88	6,698	3,766
9	170	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)	Levee Aggregate Base Roadway		88	6,698	3,766
9	171	GROUP 8	Fresno Slough Dam	San Joaquin River Bypass Canal South Option Lined	Levee Construction (Left & Right)	Mobilization		80	2,963	1,666
9	471	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits							
9	472	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 1)						
9	473	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 1)	Grade Control Structure Cost (Single Structure)					
9	474	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 1)	Grade Control Structure Cost (Single Structure)	Clearing & Grubbing		87	6,126	3,445
9	475	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 1)	Grade Control Structure Cost (Single Structure)	Onsite Earthwork For Anchor Systems (Remove & Recompact)		84	4,462	2,509
9	477	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 1)	Grade Control Structure Cost (Single Structure)	Deliver Materials (CMI Atlanta GA, 1 Truck)		76	1,774	998
9	478	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 1)	Grade Control Structure Cost (Single Structure)	Construct Driving Guide & Use As Wales		83	4,029	2,266
9	479	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 1)	Grade Control Structure Cost (Single Structure)	Sheet Pile Installation (Single Sheet 20'x420')		103	38,638	21,728
9	480	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 1)	Grade Control Structure Cost (Single Structure)	Caps For Tops (20' Lengths Material & Labor)		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	481	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 1)	Grade Control Structure Cost (Single Structure)	Anchor Support System (Pilings, Cable, Wales, Etc)		83	4,029	2,266
9	482	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 1)	Grade Control Structure Cost (Single Structure)	Dust Control		79	2,376	1,336
9	483	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 2)						
9	484	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 2)	Grade Control Structure Cost (Single Structure)					
9	485	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 2)	Grade Control Structure Cost (Single Structure)	Clearing & Grubbing		87	6,126	3,445
9	486	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 2)	Grade Control Structure Cost (Single Structure)	Onsite Earthwork For Anchor Systems (Remove & Recompact)		84	4,462	2,509
9	488	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 2)	Grade Control Structure Cost (Single Structure)	Deliver Materials (CMI Atlanta GA, 2 Trucks)		76	1,774	998
9	489	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 2)	Grade Control Structure Cost (Single Structure)	Construct Driving Guide & Use As Wales		83	4,029	2,266
9	490	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 2)	Grade Control Structure Cost (Single Structure)	Sheet Pile Installation (Single Sheet 20'x420')		103	38,638	21,728
9	491	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 2)	Grade Control Structure Cost (Single Structure)	Caps For Tops (20' Lengths Material & Labor)		83	4,029	2,266
9	492	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 2)	Grade Control Structure Cost (Single Structure)	Anchor Support System (Pilings, Cable, Wales, Etc)		83	4,029	2,266
9	493	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Drop Structure (Weir 2)	Grade Control Structure Cost (Single Structure)	Dust Control		79	2,376	1,336

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	494	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Bank Revetment						
9	495	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Bank Revetment	Riprap - Labor			83	4,029	2,266
9	497	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Temporary Bypass Channel						
9	498	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Temporary Bypass Channel	Coffer Dam			103	38,638	21,728
9	499	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Temporary Bypass Channel	Dewatering (Upstream & Downstream)			83	4,029	2,266
9	500	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Temporary Bypass Channel	Channel Excavation (Bypass)			88	6,698	3,766
9	501	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Other Costs						
9	502	GROUP 9	MPBC Initial Alternative 3 FSD Mendota Dam Retrofits	Other Costs	Mobilization			80	2,963	1,666
9	63	GROUP 10	Relocation/Modifications							
9	64	GROUP 10	Relocation/Modifications	Canal						
9	65	GROUP 10	Relocation/Modifications	Canal	Canal Relocations			88	6,698	3,766
9	66	GROUP 10	Relocation/Modifications	Canal	Mobilization			80	2,963	1,666
9	67	GROUP 10	Relocation/Modifications	Utilities						
9	68	GROUP 10	Relocation/Modifications	Utilities	Overhead Electrical Distribution Removal & Replacement			83	4,029	2,266
9	69	GROUP 10	Relocation/Modifications	Utilities	Mobilization			80	2,963	1,666
9	70	GROUP 10	Relocation/Modifications	Utilities						

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	71	GROUP 10	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 2 Each Locations)						
9	72	GROUP 10	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 2 Each Locations)	Site Preparation & Construction					
9	73	GROUP 10	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 2 Each Locations)	Site Preparation & Construction	Clearing & Grubbing		87	6,126	3,445
9	74	GROUP 10	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 2 Each Locations)	Site Preparation & Construction	Earthwork (Using Loader & Truck)		88	6,698	3,766
9	75	GROUP 10	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 2 Each Locations)	Site Preparation & Construction	Revegetation		88	6,698	3,766
9	76	GROUP 10	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 2 Each Locations)	Site Preparation & Construction	Pull Pump & Column & Reinstall After Modifications		83	4,029	2,266
9	77	GROUP 10	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 2 Each Locations)	Site Preparation & Construction	Column Extension		83	4,029	2,266
9	78	GROUP 10	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 2 Each Locations)	Site Preparation & Construction	Casing Extension		83	4,029	2,266
9	79	GROUP 10	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 2 Each Locations)	Site Preparation & Construction	Discharge Piping Modifications		83	4,029	2,266
9	80	GROUP 10	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 2 Each Locations)	Site Preparation & Construction	Replace Electrical Panel		81	3,070	1,727
9	81	GROUP 10	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 2 Each Locations)	Site Preparation & Construction	PG&E Electrical Service		81	3,070	1,727
9	82	GROUP 10	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 2 Each Locations)	Site Preparation & Construction	Dust Control		79	2,376	1,336

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	83	GROUP 10	Relocation/Modifications	Groundwater Well Floodproofing (Quantities Reflect 2 Each Locations)	Site Preparation & Construction	Mobilization		80	2,963	1,666
9	307	GROUP 11	Fresno Slough Dam							
9	308	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1						
9	309	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station					
9	310	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	Clearing & Grubbing		87	6,126	3,445
9	311	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	Site Excavation		88	6,698	3,766
9	312	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	Excavate Ditch To Connect Pump Inlet To River Thalweg		88	6,698	3,766
9	313	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	Structure Backfill		88	6,698	3,766
9	314	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	Structure Concrete		83	4,029	2,266
9	315	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	Pumps & Motors (50HP)		83	4,029	2,266
9	316	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	36" Pump Discharge Assemblies		80	2,963	1,666
9	317	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	Trashracks		83	4,029	2,266
9	318	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	Miscellaneous Metals		83	4,029	2,266
9	319	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	Flow Meter In Each Discharge Pipe		81	3,070	1,727
9	320	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	Coffer Dam		103	38,638	21,728
9	321	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	Dewatering Within Coffer Dam		83	4,029	2,266
9	322	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	Dust Control		79	2,376	1,336
9	323	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	SWPPP		75	1,581	889
9	324	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Mendota Pool Pump Station	Worker Protection		82	3,529	1,984
9	325	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Earthen Canal (Columbia Canal Feeder)					
9	326	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Earthen Canal (Columbia Canal Feeder)	Clearing & Grubbing		87	6,126	3,445
9	327	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Earthen Canal (Columbia Canal Feeder)	Site Excavation		88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	328	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Earthen Canal (Columbia Canal Feeder)	Loader/Excavator & Truck For Material (Compact Volume +20%)		88	6,698	3,766
9	329	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Earthen Canal (Columbia Canal Feeder)	Haul Truck (<20 Miles Transport (Compacted Volume +20%)		88	6,698	3,766
9	330	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Earthen Canal (Columbia Canal Feeder)	Earthwork Fill (Compacted)		88	6,698	3,766
9	331	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Earthen Canal (Columbia Canal Feeder)	Structure Concrete (Headwall)		83	4,029	2,266
9	332	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Earthen Canal (Columbia Canal Feeder)	Transition Structure Concrete		83	4,029	2,266
9	333	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Earthen Canal (Columbia Canal Feeder)	Purchasing & Hauling Gravel For Roadway, 100 LB/CF		86	5,617	3,159
9	334	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Earthen Canal (Columbia Canal Feeder)	Gravel Placement For Road At 6" Thick		88	6,698	3,766
9	335	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Earthen Canal (Columbia Canal Feeder)	Dust Control		79	2,376	1,336
9	336	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Earthen Canal (Columbia Canal Feeder)	SWPPP		75	1,581	889
9	337	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Earthen Canal (Columbia Canal Feeder)	Worker Protection		82	3,529	1,984
9	338	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon					
9	339	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon	Clearing & Grubbing		87	6,126	3,445
9	340	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon	Excavate & Fill Bore Pit (30' x 30' x 22' Deep)		83	4,029	2,266
9	341	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon	Bore & Jack 114" Steel Carrier Pipe		86	5,460	3,070
9	342	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon	Reinforced Concrete Pipe (RCP, Pipe, 84", D-25)		83	4,029	2,266
9	343	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon	Reinforced Concrete Pipe (RCP, Bends, 84", D-25)		83	4,029	2,266
9	344	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon	Pressure Grout Annular Space		82	3,619	2,035
9	345	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon	Excavate & Fill Receiving Pit (30' x 30' x 22' Deep)		83	4,029	2,266
9	346	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon	Structure Excavation (Inlet Structure)		88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	347	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon	Structure Backfill		88	6,698	3,766
9	348	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon	Structure Concrete (Inlet Structure)		83	4,029	2,266
9	349	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon	Dust Control		79	2,376	1,336
9	350	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon	SWPPP		75	1,581	889
9	351	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Siphon	Worker Protection		82	3,529	1,984
9	352	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station					
9	353	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	Clearing & Grubbing		87	6,126	3,445
9	354	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	Structure Excavation		88	6,698	3,766
9	355	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	Structure Backfill		88	6,698	3,766
9	356	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	Structure Concrete		83	4,029	2,266
9	357	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	Pumps & Motors (75HP)		83	4,029	2,266
9	358	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	54" Pump Discharge Assemblies		80	2,963	1,666
9	359	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	72" Steel Pipe		84	4,462	2,509
9	360	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	Trashrack		83	4,029	2,266
9	361	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	Miscellaneous Metals		83	4,029	2,266
9	362	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	Coffer Dam		103	38,638	21,728
9	363	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	Dewatering Within Coffer Dam		83	4,029	2,266
9	364	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	Dust Control		79	2,376	1,336
9	365	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	SWPPP		75	1,581	889
9	366	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Columbia Canal Pump Station	Worker Protection		82	3,529	1,984
9	367	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal					
9	368	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Clearing & Grubbing		87	6,126	3,445
9	369	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Structure Concrete (West Check Structure & Headwall)		83	4,029	2,266
9	370	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Riprap, Facing Class Purchase, 100 LB/CF, 2' Deep		83	4,029	2,266

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	371	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Remove Old Pump Structure & Flume		83	4,029	2,266
9	372	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Onsite Excavation		88	6,698	3,766
9	373	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Loader/Excavator & Truck For Material (Compact Volume +20%)		88	6,698	3,766
9	374	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Haul Truck (<20 Miles Transport (Compacted Volume +20%)		88	6,698	3,766
9	375	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Raising Canal 5' - 2,700', 1.5 Side Slopes, 4' Bottom, 12' Roadways		88	6,698	3,766
9	376	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Canal Lining At 6" Thick		83	4,029	2,266
9	377	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Purchasing & Hauling Gravel For Roadway, 100 LB/CF		86	5,617	3,159
9	378	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Gravel Placement For Road At 6" Thick, 2,700' On Both Banks		88	6,698	3,766
9	379	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Structure Concrete (East Check Structure)		83	4,029	2,266
9	380	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Dust Control		79	2,376	1,336
9	381	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	SWPPP		75	1,581	889
9	382	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Worker Protection		82	3,529	1,984
9	383	GROUP 11	Fresno Slough Dam	Columbia Canal Siphon FP-1	Raising Columbia Canal	Mobilization		80	2,963	1,666
9	384	GROUP 12	Fresno Slough Dam							
9	385	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations						
9	386	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Main Canal Realignment					
9	387	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Main Canal Realignment	Clearing & Grubbing		87	6,126	3,445
9	388	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Main Canal Realignment	Demolish Existing Headworks		87	6,126	3,445
9	389	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Main Canal Realignment	Onsite Excavation		88	6,698	3,766
9	390	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Main Canal Realignment	Earthwork Fill (Compacted)		88	6,698	3,766
9	391	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Main Canal Realignment	Concrete Canal Lining (6" Thickness)		83	4,029	2,266
9	392	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Main Canal Realignment	Buy & Haul Gravel For Roadway, 100 LB/CF		88	6,698	3,766

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	393	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Main Canal Realignment	Gravel Placement For Road At 6" Thick		88	6,698	3,766
9	394	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Main Canal Realignment	Riprap, Facing Class Purchase, 100 LB/CF, 2' Deep		83	4,029	2,266
9	395	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Main Canal Realignment	Place Riprap		83	4,029	2,266
9	396	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Main Canal Realignment	Dust Control		79	2,376	1,336
9	397	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Main Canal Realignment	SWPPP		75	1,581	889
9	398	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Main Canal Realignment	Worker Protection		82	3,529	1,984
9	399	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment					
9	400	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	Clearing & Grubbing		87	6,126	3,445
9	401	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	Demolish Existing Headworks		87	6,126	3,445
9	402	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	Onsite Excavation		88	6,698	3,766
9	403	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	Loader/Excavator & Truck For Material (Compacted Vol + 20%)		88	6,698	3,766
9	404	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	Haul Truck (<20 Miles Transport, Compacted Vol + 20%)		88	6,698	3,766
9	405	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	Earthwork Fill (Compacted)		88	6,698	3,766
9	406	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	Concrete Canal Lining (6" Thickness)		83	4,029	2,266
9	407	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	Buy & Haul Gravel For Roadway, 100 LB/CF		88	6,698	3,766
9	408	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	Gravel Placement For Road At 6" Thick		88	6,698	3,766
9	409	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	Riprap, Facing Class Purchase, 100 LB/CF, 2' Deep		83	4,029	2,266
9	410	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	Place Riprap		83	4,029	2,266
9	411	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	Dust Control		79	2,376	1,336
9	412	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	SWPPP		75	1,581	889
9	413	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Helm's Ditch Realignment	Worker Protection		82	3,529	1,984
9	414	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure					
9	415	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	Drive & Remove 1 Row Temp Sheet Piling To Isolate Inlet		103	38,638	21,728

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	416	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	Dewater Behind Sheet Piling		83	4,029	2,266
9	417	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	Furnish & Install 1 Row Permanent Sheet Piling For Cut-Off Wall		103	38,638	21,728
9	418	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	Structure Concrete		83	4,029	2,266
9	419	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	Furnish & Install 15' Wide x 15' Tall Radial Gates		83	4,029	2,266
9	420	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	Furnish & Install 3 Wire Rope Hoists For Radial Gates		83	4,029	2,266
9	421	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	48" Concrete Pipeline		83	4,029	2,266
9	422	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	Concrete Junction Box With Slide Gate		80	2,963	1,666
9	423	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	Excavation For North Headworks Structure		88	6,698	3,766
9	424	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	Backfill Around North Headworks Structure		88	6,698	3,766
9	425	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	Onsite Electrical/Telemetry		81	3,070	1,727
9	426	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	Miscellaneous Metals		83	4,029	2,266
9	427	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	Dust Control		79	2,376	1,336
9	428	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	SWPPP		75	1,581	889
9	429	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Control Structure	Worker Protection		82	3,529	1,984
9	430	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Bridge Over Realigned Main Canal					
9	431	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Bridge Over Realigned Main Canal	120' x 30' Bridge Structure (Pilings, Abutments, Excavation, Backfill, Stem,		83	4,029	2,266
9	433	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Bridge Over Realigned Main Canal	Modify Mendota Potable Water Pipeline To Cross Bridge		83	4,029	2,266
9	434	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Bridge Over Realigned Main Canal	Dust Control		79	2,376	1,336
9	435	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Bridge Over Realigned Main Canal	SWPPP		75	1,581	889
9	436	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Bridge Over Realigned Main Canal	Worker Protection		82	3,529	1,984
9	437	GROUP 12	Fresno Slough Dam	Main Canal & Helm Ditch Relocations	Bridge Over Realigned Main Canal	Mobilization		80	2,963	1,666
9	438	GROUP 13	Relocations SJR Bypass Canal South Option							

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	439	GROUP 13	Relocations SJR Bypass Canal South Option	Canal						
9	440	GROUP 13	Relocations SJR Bypass Canal South Option	Canal	Canal Relocations			88	6,698	3,766
9	441	GROUP 13	Relocations SJR Bypass Canal South Option	Canal	Mobilization			80	2,963	1,666
9	442	GROUP 13	Relocations SJR Bypass Canal South Option	Utilities						
9	443	GROUP 13	Relocations SJR Bypass Canal South Option	Utilities	Overhead Electrical Distribution Removal & Replacement			83	4,029	2,266
9	444	GROUP 13	Relocations SJR Bypass Canal South Option	Utilities	Mobilization			80	2,963	1,666
9	445	GROUP 13	Relocations SJR Bypass Canal South Option	Pump Station						
9	446	GROUP 13	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)					
9	447	GROUP 13	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Clearing & Grubbing		87	6,126	3,445
9	448	GROUP 13	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Canal/Drain Relocation		88	6,698	3,766
9	449	GROUP 13	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Concrete Lining (Intake & Outfall)		83	4,029	2,266
9	450	GROUP 13	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Rock Riprap At Outfall		83	4,029	2,266
9	451	GROUP 13	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Pump & Sump Relocation		83	4,029	2,266
9	452	GROUP 13	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Replace Electrical Panel		81	3,070	1,727

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	453	GROUP 13	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	PG&E Electrical Service		81	3,070	1,727
9	454	GROUP 13	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	12" Steel Pipe		83	4,029	2,266
9	455	GROUP 13	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Dust Control		79	2,376	1,336
9	456	GROUP 13	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Worker Protection		82	3,529	1,984
9	457	GROUP 13	Relocations SJR Bypass Canal South Option	Pump Station	General Pump Station Site Preparation & Construction (2 Each Locations)	Mobilization		80	2,963	1,666
9	458	GROUP 13	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing						
9	459	GROUP 13	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)					
9	460	GROUP 13	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Clearing & Grubbing		87	6,126	3,445
9	461	GROUP 13	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Earthwork (Loader & Truck)		88	6,698	3,766
9	462	GROUP 13	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Revegetation		88	6,698	3,766
9	463	GROUP 13	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Pull Pump & Column and Reinstall After Modifications		83	4,029	2,266
9	464	GROUP 13	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Column Extension		83	4,029	2,266
9	465	GROUP 13	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Casing Extension		83	4,029	2,266
9	466	GROUP 13	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Discharge Pipe Modifications		83	4,029	2,266
9	467	GROUP 13	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Replace Electrical Panel		81	3,070	1,727

Schedule Name	Item	Group	Activity 1	Activity 2	Activity 3	Activity 4	Activity 5	Total Adjusted SPL (dBA) @ 50 feet	Distance to 45 dBA SPL Contour (feet)	Distance to 50 dBA SPL Contour (feet)
9	468	GROUP 13	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	PG&E Electrical Service		81	3,070	1,727
9	469	GROUP 13	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Dust Control		79	2,376	1,336
9	470	GROUP 13	Relocations SJR Bypass Canal South Option	Deep Well Floodproofing	Site Preparation & Construction (2 Each Locations)	Mobilization		80	2,963	1,666
9	38	GROUP 14	Vegetation & Irrigation							
9	39	GROUP 14	Vegetation & Irrigation	General Description						
9	40	GROUP 14	Vegetation & Irrigation	General Description	Plant Establishment (12 Months)			81	3,070	1,727
9	41	GROUP 14	Vegetation & Irrigation	General Description	Landscape Maintenance (12 Months Or As Needed)			81	3,070	1,727
9	42	GROUP 14	Vegetation & Irrigation	General Description	Agricultural Topsoil (6" Layer)			88	6,698	3,766
9	43	GROUP 14	Vegetation & Irrigation	General Description	Erosion Control Fabric			80	2,963	1,666
9	44	GROUP 14	Vegetation & Irrigation	General Description	Irrigation System			81	3,070	1,727
9	45	GROUP 14	Vegetation & Irrigation	General Description	Beaver Fence			80	2,963	1,666
9	46	GROUP 14	Vegetation & Irrigation	General Description	Seeding			88	6,698	3,766
9	47	GROUP 14	Vegetation & Irrigation	General Description	Pole Cuttings			80	2,963	1,666
9	48	GROUP 14	Vegetation & Irrigation	General Description	Fascine Bundle			80	2,963	1,666
9	49	GROUP 14	Vegetation & Irrigation	General Description	Instream Woody Material			80	2,963	1,666
9	54	GROUP 14	Vegetation & Irrigation	General Description	Treepot Installation DP - Cmb			81	3,070	1,727
9	55	GROUP 14	Vegetation & Irrigation	General Description	Treepot Installation DP - Crg			81	3,070	1,727
9	56	GROUP 14	Vegetation & Irrigation	General Description	Treepot Installation DP - Rbh			81	3,070	1,727
9	57	GROUP 14	Vegetation & Irrigation	General Description	Treepot Installation DP - Sgf			81	3,070	1,727
9	60	GROUP 14	Vegetation & Irrigation	General Description	Treepot Installation D6 - Swt			81	3,070	1,727
9	61	GROUP 14	Vegetation & Irrigation	General Description	Treepot Installation D6 - Bwt			81	3,070	1,727
9	62	GROUP 14	Vegetation & Irrigation	General Description	Mobilization			80	2,963	1,666

Mendota Pool Bypass and Reach 2B Improvements Project

Appendix 19-A

Draft
Environmental Impact Statement/Report

SAN JOAQUIN RIVER
RESTORATION PROGRAM

Draft
June 2015

DRAFT PHASE I ESA REPORT

SAN JOAQUIN RIVER RESTORATION PROJECT REACH 2B IMPROVEMENTS PROJECT MENDOTA, CA 93640

Prepared for

San Joaquin River Restoration Program

December 14, 2011

URS Corporation
1333 Broadway, Suite 800
Oakland, CA 94612

18600200

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Attachments

A Regulatory Records Documentation

B Historical Documentation

C Well Search Report

URS Corporation (URS) was retained by the U.S. Department of the Interior, Bureau of Reclamation, San Joaquin River Restoration Program to conduct a Phase I Environmental Site Assessment (ESA) of the Mendota Pool Bypass and Reach 2B Improvements Project located in the area of the Chowchilla Bifurcation Structures and downstream to Mendota Dam in Mendota, Fresno and Madera Counties, California (Project area). The purpose of this Phase I ESA is to evaluate whether current or historical activities on or near the subject property may have resulted in significant impacts from hazardous substances or petroleum products, also known as recognized environmental conditions (RECs). The Phase 1 ESA results will be used in the development of the hazardous materials section in the San Joaquin River Restoration Reach 2B Improvements Project Environmental Impact Report (EIR).

The subject property is approximately 11,000 acres in size and consists of land used for agricultural purposes, including row crops, orchards and vineyards. The Mendota Dam dams the San Joaquin River and creates the Mendota Pool, which is used to support the surrounding agricultural land uses. The Chowchilla Bifurcation Structures are used for flood control purposes by the California Department of Water Resources. The normal San Joaquin river flow is released into the San Joaquin river channel. Under flood conditions, the bifurcation dam is opened to spilt the flow between the San Joaquin River channel and the normally dry Chowchilla by-pass channel. Two to three farmhouses with assorted farm buildings were noted on the southeast portion of the project site during the site reconnaissance. Surrounding land use is predominantly commercial and residential.

Topographic coverage of the area is provided by the USGS 7.5-minute series topographic quadrangle map of Mendota Dam, dated 1984, and the USGS 15-minute series topographic quadrangle map of Firebaugh, dated 1962. According to URS' review of the USGS topographic map, the surface elevation of the Project area ranges from approximately 175 feet above mean sea level (msl) at the Chowchilla Bifurcation Structures, to 155 above msl at the Mendota Dam. Area topography has an overall slope to the west. Local groundwater flow direction beneath the subject property may vary, but is inferred to be predominantly to the west. According to the Environmental Data Resources (EDR) database report, the Project area is located within the 100-year flood zone of the San Joaquin River.

No information regarding title records, environmental liens or activity and use limitations, specialized knowledge, valuation reduction for environmental issues, or other information was provided by San Joaquin River Restoration Program (SJRRP) Team indicative of a potential REC associated with the subject property.

Based on a review of the available historical documentation, the Project area was undeveloped land used for agricultural purposes from at least 1925 until the 1950s. From the late 1950s until the present, the Project area was developed with the Mendota Dam, the Mendota Pool, the Chowchilla Bifurcation Structures, sewage treatment plant, levees, marshlands, and farmland.

The EDR database search of facilities on the federal and state lists was reviewed for information on whether hazardous substances, wastes or petroleum products have been improperly handled, stored, or disposed on the subject property and adjacent properties. The following sites within the Project area, or on the boundary of the specified Project area, were identified in the database report as potential REC sites:

- Paramount Farming Company, 10317 Eastside Drive, Firebaugh, CA

- Mendota Solid Waste Disposal, ½ mile east of Bass Avenue, Mendota, CA
- Frank A Logoluso Farms, 2369 San Mateo Avenue, Mendota, CA
- AES Mendota/Covanta Mendota LP, 400 Guillen Parkway, Mendota, CA

Paramount Farming Company at 10317 Eastside Drive in Firebaugh, CA, is located on the northern boundary of the Project area. The site has been identified as having 2.4 tons of asbestos containing waste, and the disposal method is listed as landfill or surface impoundment that will be closed as a landfill (to include on-site treatment and/or stabilization). The site represents a potential environmental concern to the Project area due to the presence of asbestos containing waste.

The following historic REC (HREC) was identified in connection with the Project area:

- Because the Project area was historically used as farmland, pesticide/herbicide residuals may be present in the soil. However, features were not identified (e.g., impoundments, bulk storage facilities or crop dusting air strips) that suggested the handling or storage of significant quantities of pesticides and/or herbicides in the Project area.

URS has performed the Phase I ESA in conformance with the scope and limitations of American Society for Testing and Materials (ASTM) Standard E 1527-05 of the Project area. Any exceptions to, or deletions from, this practice are described in Section 1.4 of this report. This assessment has revealed one REC, the Paramount Farming Company, and one HREC, pesticide/herbicide residuals, in connection with the Project area.

During this assessment, URS identified no significant data gaps in reasonably ascertainable information reviewed and described in this report regarding the Project area which would be expected to impact our conclusions.

1.1 PURPOSE

URS was retained by the U.S. Bureau of Reclamation (Reclamation) to conduct a Phase I ESA of the Mendota Pool Bypass and Reach 2B Improvements Project located in the area of the Chowchilla Bifurcation Structures and downstream to Mendota Dam in Mendota, Fresno and Madera Counties, California (Project area). The purpose of this Phase I Environmental Site Assessment (ESA) is to provide a professional opinion on the potential for current presence of recognized environmental concern (REC) at the subject property, including potential impacts from known problems in the surrounding area. The term "recognized environmental condition," as defined by ASTM Standard E 1527-05, means:

> The presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures of the property or into the ground, ground water, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be *de minimis* are not recognized environmental conditions.

A historic REC (HREC) is defined as "an environmental condition which in the past would have been considered a REC but which may or may not be considered a REC currently. If a past release of any hazardous substances or petroleum products has occurred in connection with the property and has been remediated, with such remediation accepted by the responsible regulatory agency (for example, as evidenced by the issuance of a no further action letter or equivalent), this condition shall be considered an HREC."

This Phase I ESA was conducted according to the recommended guidelines established by ASTM Standard E 1527-05, "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process," and is generally consistent with the standards and practices set forth in Title 40 Code of Federal Regulations (CFR) Part 312 for "All Appropriate Inquiry (AAI)." For the purpose of this report, hazardous substances and petroleum products are jointly referred to as "hazardous materials."

1.2 DETAILED SCOPE-OF-SERVICES

URS performed the following work:

- Conducted a regulatory database search of known underground storage tanks (USTs); landfills; hazardous waste generation or treatment, storage and disposal facilities; and subsurface contamination in the surrounding area up to within one mile of the center of the subject property (or subject property boundaries).
- Reviewed geologic maps from the Environmental Data Resources (EDR) report for information on physical and hydrogeologic settings of the subject property.

- Researched subject property history by (a) reviewing aerial photographs covering the subject property and adjoining property; (b) reviewing topographic maps; and (c) researching the availability of fire insurance maps and city directories of the subject property and vicinity.
- Conducted interviews with the Bureau of Reclamation about the subject property usage and history.
- Conducted a site reconnaissance for obvious evidence of potential contamination such as current hazardous materials storage or use; unusually stained soils, slabs, and pavements; drains, sumps, drums, tanks, and electrical transformers; stressed vegetation; and discarded hazardous materials containers.
- Contacted pertinent local regulatory agencies for information about the subject property usage and history.
- Evaluated the information collected and prepared this report summarizing our findings, opinions, and conclusions.

URS' scope of work did not include sampling or analysis.

1.3 SIGNIFICANT ASSUMPTIONS

No significant assumptions other than those described below in the following section apply to this Phase I ESA.

1.4 LIMITATIONS AND EXCEPTIONS

No apparent conditions were encountered that would limit URS' ability to complete the Scope of Work, with the exception that portions of the subject property were covered with tall grasses limiting observations of portions of the subject property surface.

This Phase I ESA was prepared in accordance with the scope of work described in Section 1.2. The work conducted by URS is limited to the services agreed to with Reclamation and no other services beyond those explicitly stated should be inferred or are implied.

The conclusions presented in this report are professional opinions based solely upon URS' visual observations of the site and immediate site vicinity, and upon URS' interpretations of the readily available historical information, conversations with personnel knowledgeable about the site, and other readily available public information, as referenced in the report. These conclusions are intended exclusively for the purpose stated herein, at the site indicated, and for the project indicated.

This report is intended for the sole use of Reclamation and the San Joaquin River Restoration Program (SJRRP). The SJRRP comprises several Federal and State of California (State) agencies including Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Department of Water Resources, and California Department of Fish and Game. The scope of services performed during this investigation may not be appropriate for other users, and any use or re-use of this document, or the findings and conclusions presented herein is at the sole risk of said user.

This study was not intended to be a definitive investigation of possible contamination at the subject property. The purpose and scope of this investigation was to determine whether there is reason to suspect the possibility of contamination at the site. No exploratory borings, asbestos survey, soil or groundwater sampling, or laboratory analyses were performed at the subject property by URS and, therefore, the conclusions set forth herein are made without the benefit of such investigation.

This report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings of this assessment.

Opinions and recommendations presented in this report apply to site conditions and features as they existed at the time of URS' property visit, and those reasonably foreseeable. They cannot necessarily apply to conditions and features of which URS is unaware and has not had the opportunity to evaluate.

1.5 SPECIAL TERMS AND CONDITIONS

No special terms and conditions apply other than noted below.

URS' objective is to perform our work in a professional manner, exercising the customary thoroughness and competence of environmental and engineering consulting professionals, in accordance with the standard for professional services at the time and location those services are rendered. It is important to recognize that even the most comprehensive scope of services may fail to detect environmental liability on a particular site. Therefore, URS cannot act as insurers and cannot "certify or underwrite" that a site is free of environmental contamination. No expressed or implied representation or warranty is included or intended in our reports except that our work was performed, within the limits prescribed by our client, with the customary thoroughness and competence of our profession.

1.6 USER RELIANCE

This Phase I ESA report has been prepared for use solely by Reclamation and the SJRRP. This report shall not be relied upon by or transferred to any other party, or used for any other purpose, without the express written authorization of URS. This Phase I ESA report is applicable for 180 days.

2.1 LOCATION AND LEGAL DESCRIPTION

The Project area extends along the San Joaquin River from the Chowchilla Bypass Bifurcation Structure to approximately 0.6 miles downstream of the Mendota Dam, in Fresno and Madera Counties, near the town of Mendota, California. The Project area is bounded to the north by Eastside Drive and to the west by Helm Canal Road, and is approximately 1.5 miles north of State Highway 180.

A legal description of the subject property was not provided to URS.

2.2 SUBJECT PROPERTY AND VICINITY GENERAL CHARACTERISTICS

At the upstream end of the Project area, the Chowchilla Bifurcation Structure is used by the California Department of Water Resources to control and route flood releases from Friant Dam and the upstream watershed into Reach 2B and the Chowchilla Bypass, a flood protection project on the San Joaquin River. Under no-flow conditions, pools may be observed at the downstream base of the Chowchilla Bifurcation Structure in both the Chowchilla Bypass and the San Joaquin River. At the downstream end of the Project area, the Mendota Dam dams the San Joaquin River to create the Mendota Pool (Pool). The Pool is shallow, approximately seven miles long, and the elevation is maintained for the purpose of creating hydraulic head for the Fresno Slough, for irrigation purposes. During flood releases, the Mendota Dam's boards are removed, allowing the backwatered Pool to become part of the flowing river.

The Project area includes a dip-crossing at San Mateo Avenue, which consists of a culvert to convey low flows and an earthen embankment supporting the roadbed, which is overtopped during higher flows. Downstream of San Mateo Avenue, the river channel is inundated due to the Pool water surface elevation. Upstream of the crossing at San Mateo Avenue, the channel is only wetted during Interim Flows or flood releases from the Friant Dam. The Pool backwater supports perennial riparian vegetation, whereas upstream of San Mateo Avenue, the channel exhibits a sandy substrate with little vegetation other than riparian scrub communities.

Portions of the existing river corridor in Reach 2B are privately owned. Land use surrounding the Project area is primarily agricultural with the exception of the water management facilities at the Pool. Agricultural uses in the Project area include row crops, orchards and vineyards. Two or three farmhouses with assorted farm buildings were noted on the southeast portion of the Project area during the site reconnaissance. Several water diversions, canals, lift stations, and groundwater wells were noted during the site reconnaissance as being located within the Project area. In addition, electrical and natural gas distribution lines and water pipelines lie within the Project area.

2.3 PHYSICAL SETTING

Topographic coverage of the area is provided by the USGS 7.5-minute series topographic quadrangle map of Mendota Dam, dated 1984, and the USGS 15-minute series topographic quadrangle map of Firebaugh, dated 1962. According to URS' review of the USGS topographic map, the surface elevation of the Project area ranges from approximately 175 feet above mean sea level (msl) at the Chowchilla Bifurcation Structures, to 155 above msl at the Mendota Dam. Area topography has an overall slope to the west. Local groundwater flow direction beneath the

subject property may vary, but is inferred to be predominantly to the west. According to the EDR database report, the Project area is located within a 100-year flood zone.

Shallow groundwater flow direction can be influenced by various parameters, including topography, soil characteristics, and proximity to surface water such as lakes, rivers, streams, and drainage ditches. Based upon a review of the topographic map, groundwater flow direction is likely to the west. However, it should be noted that the relatively flat topography of the subject property and surrounding areas add to the difficulty of establishing likely subsurface conditions, including groundwater flow direction.

2.4 CURRENT SUBJECT PROPERTY USE

As previously noted, the California Department of Water Resources uses the Chowchilla Bifurcation Structure to control and route flood releases from Friant Dam and the upstream watershed into Reach 2B and the Chowchilla Bypass, a flood protection project on the San Joaquin River. At the downstream end of the Project area, the Mendota Dam dams the San Joaquin River to create the Mendota Pool (Pool). During flood releases, the boards are removed at the dam, allowing the backwatered Pool to become part of the flowing river.

Portions of the existing river corridor in Reach 2B are privately owned. Land use surrounding the project area is primarily agriculture with the exception of the water management facilities at the Pool. Agricultural uses in the Project area include row crops, orchards and vineyards.

2.5 DESCRIPTIONS OF STRUCTURES, ROADS AND OTHER IMPROVEMENTS

Two or three farmhouses with assorted farm buildings were noted on the southeast portion of the Project area. Several water diversions, canals, lift stations, and groundwater wells are located within the Project area. In addition, electrical and natural gas distribution lines and water pipelines lie within the Project area.

2.6 CURRENT ADJOINING PROPERTY USES

Land use surrounding the Project area is primarily agriculture with the exception of the water management facilities at the Mendota Pool. Mendota Airport is located within a half mile of the southwestern boundary of the Project area, and the town of Mendota is located about a mile from the Project area.

URS did not identify adjacent properties representing a potential environmental concern during the site reconnaissance or review of the environmental databases (discussed in Section 4.0).

As part of AAI, additional inquiries are required to be conducted by the purchaser of the property. These inquiries include:

- Identification of environmental cleanup liens against the subject property;
- Specialized knowledge or experience regarding the subject property;
- Relationship of the purchase price to the fair market value if the subject property was not contaminated;
- Commonly known or reasonably ascertainable information regarding the subject property; and,
- Degree of obviousness of the presence or likely presence of contamination at the subject property.

The SJRRP Team provided information on the current and historical uses of the subject property. Information provided by the SJRRP Team is included throughout the report.

URS requested information from SJRRP regarding environmental liens or activity and use limitations; specialized knowledge; knowledge of valuation reduction for environmental issues; owner, site manager, and occupant information; reason for conducting the Phase I ESA; and any other information pertinent to the conducting a Phase I ESA (including previous environmental assessments) for the subject property.

3.1 TITLE RECORDS

A title report was not provided to URS for the subject property, nor was obtaining a title report within URS' scope of work.

3.2 ENVIRONMENTAL LIENS OR ACTIVITY AND USE LIMITATIONS

No information regarding the existence of environmental liens or activity and use limitations associated with the subject property was provided to URS by SJRRP. URS ordered an environmental liens and activity and use limitations report from EDR for the Project area. The information received from EDR indicated that there are no environmental liens or activity and use limitations reported for the Project area. A copy of the environmental liens and activity and use limitations report is included in Attachment A.

3.3 SPECIALIZED KNOWLEDGE

No specialized knowledge, beyond what is discussed throughout this report, was conveyed to URS during the preparation of this report.

3.4 VALUATION REDUCTION FOR ENVIRONMENTAL ISSUES

No information was conveyed to URS that the property value of the subject property has been reduced due to environmental issues.

3.5 OWNER, SITE MANAGER AND OCCUPANT INFORMATION

The Project area along the San Joaquin River between the Chowchilla Bifurcation Structures and the Mendota Dam is owned by the United States Bureau of Reclamation and the California Department of Water Resources. Portions of the existing river corridor in Reach 2B are privately owned.

3.6 REASON FOR CONDUCTING PHASE I ESA

The SJRRP Team indicated that this Phase I ESA was requested in connection with the San Joaquin River Restoration Project Alternatives EIR.

3.7 OTHER USER-PROVIDED INFORMATION

URS reviewed the "San Joaquin River Restoration Program Draft Program Environmental Impact Statement/Report" prepared by SJRRP, dated April 2011. The report indicated the following:

- One site in Reach 2 is listed in the State Water Resources Control Board (SWRCB) Geotracker database. The Mendota Landfill is considered by SWRCB to have open status and potential volatile organic compound contamination.

The open status and potential contamination of the Mendota Landfill was not confirmed EDR, which states that the Mendota Solid Waste Disposal facility was a permitted solid waste disposal site that was clean closed on December 31, 1981. Since the landfill is not within the boundaries of the Project area, and it is downgradient of the Project area, the Mendota Landfill is not considered a potential REC.

No sites listed in the Department of Toxic Substances Control Board (DTSC) Cortese List, SWRCB Geotracker and Environmental Protection Agency (EPA) Enviromapper databases are located in the Chowchilla Bypass portion of the Project area. Contaminated sites, however, are likely to occur near tributaries of the Chowchilla Bypass.

4.1 STANDARD ENVIRONMENTAL RECORDS

A regulatory database search report was prepared for the subject property by EDR on October 31, 2011 in accordance with the ASTM recommended guidelines, and is presented in Attachment A in electronic format. EDR reviews databases compiled by federal, state, and local governmental agencies. URS reviewed the EDR database to evaluate whether activities on or near the subject property have the potential to create a REC on the subject property. The EDR report searches properties within a specified distance that in some instances extends beyond the ASTM standard search radii.

The regional topography in the vicinity of the subject property has an overall slope to the west per the USGS topographic map. Therefore, as shallow groundwater flow would be expected to generally follow the topographic gradient, groundwater is expected to predominantly flow to the west. Therefore, sites located east of the Project area are considered to be topographically and hydrologically upgradient.

The goal of reviewing the database report is to identify facilities that have known and documented environmental problems that may negatively impact the subject property. Subject property and adjacent property listings are discussed below. Other listed facilities, which are not listed in the database as "closed" or "no further action" (including "No Further Remedial Action Planned" or NFRAP), or are located topographically upgradient of the subject property, within the database search distances are discussed below.

The following sites within the Project area, or on the boundary of the specified Project area, were identified in the database report:

- Paramount Farming Company, 10317 Eastside Drive, Firebaugh, CA
- Mendota Solid Waste Disposal, ½ mile east of Bass Avenue, Mendota, CA
- Frank A Logoluso Farms, 2369 San Mateo Avenue, Mendota, CA
- AES Mendota/Covanta Mendota LP, 400 Guillen Parkway, Mendota, CA

Paramount Farming Company at 10317 Eastside Drive in Firebaugh, CA, is located on the northern boundary of the Project area. The site was listed in the HAZNET database, a DTSC database of hazardous waste manifests. The site has been identified as having 2.4 tons of asbestos containing waste, and the disposal method is listed as landfill or surface impoundment that will be closed as a landfill (to include on-site treatment and/or stabilization). The site represents a potential environmental concern to the Project area due to the presence of asbestos containing waste.

Mendota Solid Waste Disposal is located half a mile east of Bass Avenue, near the Fresno Slough in Mendota, CA. The site is located on the southwestern boundary of the Project area, near the Mendota Pool. The site was listed in the Integrated Waste Management Board's Solid Waste Information System (SWIS) database as a Solid Waste Facility/Landfill (SWF/LF) site. The Mendota Solid Waste Disposal facility was a permitted solid waste disposal site that was clean closed on December 31, 1981. The site is not expected to represent an environmental concern to the Project area.

Frank A. Logoluso Farms at 2369 San Mateo Avenue in Mendota, CA, is located within the Project area, south of the San Joaquin River. The site was listed in the HAZNET database, a DTSC database of hazardous waste manifests. The site has been identified as having 0.3753 tons of waste oil and mixed oil. The site is not expected to represent an environmental concern to the Project area.

AES Mendota/Covanta Mendota LP at 400 Guillen Parkway in Mendota, CA, is located on the western boundary of the Project area, near Mendota Airport. The biomass power plant was listed in several federal and California databases, as described below:

1. Federal Records
    - Resource Conservation and Recovery Act (RCRA) Small Quantity Generator (RCRA-SQG) with no violations.
    - Facility Index System (FINDS).
2. State and Local Records
    - California Water Resources Control Board (SWRCB) Waste Management Unit Database System (WMUDS/SWAT) -- The facility generates waste as part of the industrial/manufacturing process.
    - SWRCB Waste Discharge System (WDS) -- The facility treats and/or disposes of liquid or semisolid wastes as part of its industrial/manufacturing process, and has an Active status to have a continuous or seasonal discharge that is under Waste Discharge Requirements.
    - SWRCB Spills, Leaks, Investigations and Cleanup (SLIC) program – The facility has had an open site assessment status with the Central Valley RWQCB since April 20, 2010, due to an unauthorized release from an underground storage tank. Corrective action is underway.
    - CUPA Fresno – The facility is listed as a large hazardous materials handler and large quantity hazardous waste generator; contaminated site; and has aboveground storage tank (AST) capacity of 1,320 to 9,999 gallons.
    - AST – The facility has an AST capacity of 1,320 gallons.
    - SWRCB Enforcement Actions (ENF) – Notice of violation (NOV) issued on April 12, 2004 for numerous violations of Waste Discharge Requirements, including freeboard level being less than 2 feet, primary liner leaking, and unauthorized discharge to land from sprayer. An unknown NOV was issued on September 15, 2000. An additional NOV was issued on August 24, 2000, in regards to a workplan by Geological Technics, Inc. to address an NOV received on June 26, 2000. The NOV requested additional documentation of a concrete cover. The June 26, 2000 NOV was in regards to WDR violations in which electrical conductance, total dissolved solids, chloride, and sulfate concentrations in downgradient well MW-2 had increased to above background levels. An NOV issued on June 12, 2000 indicated that there were five violations of the WDR Order No. 97-135.
    - HAZNET -- The facility was listed in the HAZNET database, a DTSC database of hazardous waste manifests. In 2000, the facility was identified as having 1.2718 tons

of waste oil and mixed oil. In 1999, the facility was identified as having 0.3336 tons of waste oil and mixed oil; 0.6545 tons of aqueous solution with total organic residues less than 10 percent; 0.1328 tons of liquids with halogenated organic compounds; and 0.0417 tons of hydrocarbon solvents (benzene, hexane, Stoddard, etc.).

- Toxics and criteria pollutant emissions data collected by the Air Resources Board (ARB) and local air pollution agencies (EMI) – The facility was listed as having annual air emissions of total organic hydrocarbon gases, reactive organic gases, carbon monoxide emissions, oxides of nitrogen, oxides of sulphur, particulate matter, and particulate matter less than 10 micrometers.

The AES Mendota/Covanta Mendota LP facility is located downgradient of the Project area and on the southwestern boundary. The site is not expected to represent a potential environmental concern to the Project area.

The following sites adjacent to the Project area were identified in the database report:

- Mendota Junior High School Site, 1200 Belmont Avenue, Mendota, CA

The Mendota Junior High School Site at 1200 Belmont Avenue in Mendota, CA is located approximately 0.75 miles downgradient of the southwestern corner of the Project area. The site was listed in the state school (SCH) database containing proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. The site was also listed in DTSC's ENVIROSTOR database of sites that have known contamination. The past use of the site was agricultural, row crops. A Preliminary Endangerment Assessment Report was prepared on May 22, 2006. The site received a No Further Action status on May 22, 2006. Since the site is 0.75 miles downgradient of the southwestern corner of the Project area, the site is not expected to represent an environmental concern to the Project area.

Forty unmappable/orphan sites were listed in the EDR report. Due to poor or inadequate address information they could not be accurately located by EDR. Based on URS' review of available address information, approximately 3 of the 40 unmappable/orphan sites may be located within one mile of the Project area. These sites include the following:

- Ray Baldridge, 6353 Road 8 ½, Firebaugh, CA
- Silver Creek Packing Company Shop, 2158 Bass Avenue, Mendota, CA
- Mendota Site, 1 mile northeast of Highway 33

Ray Baldridge at 6353 Road 8 ½ in Firebaugh, CA is located within one mile northwest and downgradient of the Project area. This site is listed in the state SWEEPS underground storage tank (UST) database maintained by the SWRCB, because it has an UST. Since the site is downgradient of the northwestern corner of the Project area, the site is not expected to represent an environmental concern to the Project area.

Silver Creek Packing Company Shop at 2158 Bass Avenue in Mendota, CA is located within one mile west and downgradient of the Project area. The site is listed in the HIST CORTESE, LUST and HIST LUST databases because it had a leaking UST (LUST), according to the EDR report. Since the site is downgradient of the western boundary of the Project area, the site is not expected to represent an environmental concern to the Project area.

The Mendota Site located one mile northeast of Highway 33 in Mendota, CA is located within one mile west and downgradient of the Project area. The site is listed in the CERC-NFRAP database, a federal database of Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) No Further Remedial Action Planned sites. Since the site is downgradient of the western boundary of the Project area, the site is not expected to represent an environmental concern to the Project area.

4.2 ADDITIONAL ENVIRONMENTAL RECORD SOURCES

URS reviewed the SWRCB GeoTracker, DTSC Envirostor and EPA Envirofacts databases for additional site information. The SWRCB GeoTracker database listed several other LUST sites within 1 mile of the southwestern boundary of the Project area; however, these sites are downgradient and sufficiently far enough away from the project area that they are not expected to represent an environmental concern to the Project area.

URS did not attempt to contact public agencies for this Phase I ESA.

4.3 HISTORICAL USE INFORMATION

Based on a review of the available historical documentation, the Project area was undeveloped land used for agricultural purposes from at least 1925 until the 1950s. From the late 1950s until the present, the Project area was developed with the Mendota Dam, the Mendota Pool, the Chowchilla Bifurcation Structures, sewage treatment plant, levees, marshlands, and farmland.

Copies of pertinent portions of historical research documents reviewed and discussed below are presented in Attachment B in electronic format.

4.4 AERIAL PHOTOGRAPHS

URS ordered historical aerial photographs covering the subject property from EDR for the years 1937, 1955, 1965, 1974, 1981, 1987, 1998, 2009 and 2010. The aerial photographs were reviewed to identify potential sources of visible contamination at the time the photographs were taken. A summary evaluation of the above referenced aerial photographs follows:

1937 – Review of the 1937 aerial photo revealed that the Project area and adjacent properties were undeveloped and agricultural/ranch land. State Highways 130 and 180 were present near the slough. In addition, unimproved roads criss-crossed the Project area.

1955 – Many changes to the Project area occurred between 1937 and 1955. The Mendota Dam was depicted in the photo, and a sewage disposal facility with one building and two ponds had been built adjacent to the Fresno Slough. The Fresno Slough was larger than in 1937, and areas that were once shrublands along the Slough were shown as being covered in water. Mowry Lake was no longer visible. Levees were built along the eastside of the Slough and on the north and south banks of the San Joaquin River. Willow Slough was now evident north of the river, and linked to the river near a gaging station. Shrublands were more evident on the banks of the river, and the inundated areas south of the river appear to have been converted to farms. Ranches and farms were evident in the Project area.

1965 – The Mendota Pool was depicted, and the sewage disposal facility had one building and two pools adjacent to the Fresno Slough, south of Mendota Pool. The city of Mendota is shown, as is the small reservoir/water tank just east of the city, and gas and water wells were scattered north of the San Joaquin River. The inundated areas east of the Slough had become much smaller, and most of it had been converted to farmland. Ranches and farms were evident in the Project area. No other major changes were depicted to the Project area or adjacent properties from 1955.

1974 – The sewage disposal facility grew much larger between 1965 and 1974. In 1974, the facility had two buildings, and four ponds, and two to three marshland areas. The Mendota Pool had also been made larger, and the Mowry Canal was gone. Willow Slough/Chowchilla Canal north of the river had become much larger and appeared to be used as a bypass, with levees on both sides of the Canal, and a gaging station at the San Joaquin River. Formerly inundated areas east of the Fresno Slough appeared dry, and converted to farmland. A large lake/pond is shown just south of a bend in the San Joaquin River. A portion of the Mendota Airport runway is shown west of the Fresno Slough. Ranches and farmland are depicted on both sides of the river, and in the Project area.

1981 – The sewage disposal plant had grown much larger, and now had nine to ten ponds, and no buildings. According to the EDR report, the Mendota Solid Waste Disposal Facility (depicted in the same location as the sewage disposal plant) was closed in 1981. The Mendota Airport runway and buildings are shown west of the Fresno Slough. The Chowchilla Canal north of the river was shown and appeared to be used as a bypass, with levees on both sides of the Canal, and a gaging station at the San Joaquin River. Marshlands were still present east of the Fresno Slough, but the ponds were much smaller, if not converted to farmland. The large lake/pond shown just south of a bend in the San Joaquin River, appeared smaller and drier. Ranches and farmland are depicted on both sides of the river, and in the Project area.

1987 – The Mendota Solid Waste Disposal Facility (depicted in the same location as the sewage disposal plant) still had 10 ponds, but four of them were smaller, possibly buried with soil. Some kind of stadium-like structure was constructed east of the Fresno Slough and south of the Project area. The lake/pond shown just south of a bend in the San Joaquin River had nearly disappeared. No other major changes were depicted to the Project area or adjacent properties from 1981.

1998 – AES Mendota/Covanta Mendota LP biomass plant and associated buildings is shown west of the Fresno Slough, near Mendota Airport. The area of the former sewage disposal plant/Mendota Solid Waste Disposal Facility had undergone changes, and appeared to have numerous ponds and plots of land in the vicinity. Lines, possibly transmission lines, could be seen near the biomass plant west of the Fresno Slough. Ranches and farms were scattered throughout the Project area, and an area south of the river appeared to have been converted to vineyards. Some inundated areas were visible, but most of the land around the Fresno Slough, San Joaquin River and Chowchilla Bypass appeared to be used as farmland.

2009 – No other major changes were depicted to the Project area or adjacent properties from 1998.

2010 – More development is evident in the area of the former sewage disposal plant/Mendota Solid Waste Disposal Facility. Some areas of inundation are shown east of the Fresno Slough, but no other major changes were depicted to the Project area or adjacent properties from 2009.

Based on a review of the historical aerial photographs, no RECs were identified.

4.5 TOPOGRAPHIC MAPS

URS reviewed USGS 15-minute series topographic maps of the Tranquility, California quadrangle dated 1946, and the Firebaugh, California quadrangle provided by EDR dated 1948, 1959 and 1962; and 7.5-minute series topographic maps of the Tranquility, California quadrangle dated 1924, 1947, 1948, 1956 and 1984; the Firebaugh, California quadrangle dated 1956 and 1984; and the Mendota Dam, California quadrangle dated 1924, 1947, 1948, 1956, 1984. A summary evaluation of the topographic maps follows:

1924 – The Project area and adjacent properties were depicted as undeveloped and agricultural/ranch land. The Fresno Slough was named the Kings River Slough in 1924. An unnamed dam was located in the same location as the present Mendota Dam, and was at an elevation of 160 feet above mls. Ponds and lakes are shown east of the Slough, and sandy soil is shown on the banks of the San Joaquin River north of the dam. State Highways 130 and 180 were present near the Kings River Slough, and the Southern Pacific Railroad crossed over the Kings River Slough south of the Project area. The Southern Pacific Railroad route ran north and south and east and west through the Project area. In addition, unimproved roads criss-crossed the Project area. Pomona Ranch and White House Ranch were depicted north of the San Joaquin River, likely within the Project area. Herminghaus Ranch was depicted southeast of the Project area, but north of State Highway 180. Mowry Lake was shown just south of the San Joaquin River, and the Columbia Canal and the Mowry Canal were shown north and south and of the river, respectively.

1946 – The Project area and adjacent properties were still depicted as undeveloped and agricultural/ranch land. Kings River Slough name was changed to the Fresno Slough. The town of Tranquility had been built, and many unimproved roads criss-crossed the area south of Whites Bridge Road/State Highway 180 and north of Tranquility. The city street blocks of Tranquility are evident south of the Fresno Slough. The Fresno Slough By-Pass was depicted south of Southern Pacific Railroad, near the town of Tranquility. Levees were built south and north of the Fresno Slough. Heminghuas Ranch had two buildings in 1946.

1947 – The dam on the San Joaquin River was labeled the Mendota Dam. The town of Mendota had been built, and the Chowchilla Canal was depicted north of the San Joaquin River. The Pomona Ranch north of the river had grown and increased the number of buildings, and the Mowry Ranch was shown on the southern bank of the San Joaquin River, east of the Fresno Slough. Small levees are evident between the Mowry Ranch and the Mowry Canal. Ponds and lakes are depicted east of the Slough and south of the river. Gas wells are shown north of the Project area.

1948 – Levees were built on both the north and south banks of the San Joaquin River. Shrubland was depicted around the San Joaquin River and the Fresno Slough. Sandy soil is shown on the banks of the San Joaquin River north of the Mendota Dam. Lakes and ponds were present east of the Fresno Slough and south of the San Joaquin River. Little else had changed from 1947.

1956 – Many changes to the Project area occurred between 1948 and 1956. The Mendota Pool was depicted, and a gaging station had been installed on the Mendota Dam. The Mendota Dam elevation had decreased to 155 ft above mls. A sewage disposal facility with one building and two ponds had been built adjacent to the Fresno Slough, south of Mendota Pool. The Fresno Slough was larger than in previous years, and areas that were once shrublands along the Slough were shown as being covered in water. The lakes/ponds that were adjacent to the east of the Slough had become larger, and channels were evident linking the Slough to the lakes/ponds. Mowry Lake was no longer visible. Levees were built along the eastside of the Slough and on the north and south banks of the San Joaquin River. Shrublands were more evident on the banks of the river, and the inundated areas east of the Slough and south of the river were gone. The levees had pumps, and the levees joined east of the Slough and south of the river. A flume pump was added to the Columbia Canal on the north bank of the river. The Delta-Mendota Canal with a lock was depicted southwest of the Mendota Pool. Helm Ditch was constructed west of the river and north of Mendota Dam near Helm Ranch. Willow Slough was now evident north of the river, and linked to the river near the gaging station. Mowry Ranch was still present, and Pomona Ranch had grown and added more buildings. Yearout Ranch was shown north of State Highway 180 and east of the Slough. The town of Mendota grew larger, and a reservoir was located east of the town. Gas and water wells were scattered north of the San Joaquin River. The land south of Whites Bridge Road/State Highway 180 and east of the Fresno Slough near the town of Tranquility had been converted into marshland and ponds. The land north of State Highway 180 and east of the Slough had been turned into fish rearing ponds and marshland.

1962 – No major changes were depicted to the Project area or adjacent properties. The town of Mendota had grown larger. Pomona Ranch had downsized, and Mowry Ranch was still present.

1984 – The sewage disposal plant had grown much larger, and now had nine to ten ponds. According to the EDR report, the Mendota Solid Waste Disposal (depicted in the same location as the sewage disposal plant) was closed in 1981. The Mendota Pool had also been made larger, and the Mowry Canal was gone. The Chowchilla Canal north of the river had become much larger and appeared to be used as a bypass. Mowry Ranch had grown to three buildings, Helm Ranch had grown larger and Pomona Ranch had gotten smaller. The fish rearing ponds north of State Highway 180 had grown much larger than in 1962, and it appears that vineyards had been planted near Yearout Ranch and on both sides of Southern Pacific Railroad. Marshlands were still present east of the Fresno Slough, but the ponds were gone. The area east of Fresno Slough and south of State Highway 180 had been designated Alkali Sink Ecological Reserve.

Based on a review of the historical topographic maps, no RECs were identified.

4.6 SANBORN FIRE INSURANCE MAPS

URS ordered Sanborn Fire Insurance Maps (Sanborns) for the Project area from EDR. EDR's response indicated that Sanborn map coverage is not available for the subject property and its vicinity.

4.7 CITY DIRECTORIES

URS did not request historical city directory information from EDR for the Project area, since the Project area is so large, and no cities are present within the Project area.

5.1 METHODOLOGY AND LIMITING CONDITIONS

Mr. Joe Morgan of URS' Oakland office toured the Site on August 2, 2011 as part of an EIR team tour. The tour was conducted by the team leaders from Bureau of Reclamation, Cardno Entrix and URS. The weather was clear and hot.

The tour started at the Mendota Dam/Pool. The team observed the Mendota Dam and the Mendota Pool. The team also observed the nearby downstream portion of the San Joaquin River past the Dam with riverine vegetation along the riverbank, a public access point, and the surrounding agricultural land devoted to row crops. The team also observed a small residential community downgradient of the Mendota Dam.

The team then drove to the Chowchilla Bifurcation Structure and observed: the two dams, the up- and down-stream portion of the river, and the Chowchilla By-Pass. The Chowchilla By-Pass was dry during the tour, as it is only used for flood control purposes. The banks of the river were lined with riverine vegetation. All three Dams within the project area are within fenced enclosures with locked gates, and are not open to the public.

The surrounding land is used for agricultural purposes, including: row crops, orchards, and vineyards. Two to three farmhouses with assorted farm buildings were noted on the southeast portion of the project site. One outbuilding was constructed of older style sheet metal, likely painted with lead containing paint. The same farmstead may have an underground storage tank.

5.2 INTERIOR AND EXTERIOR OBSERVATIONS

The Mendota Dam dams the San Joaquin River and creates the Mendota Pool, which is used to support the surrounding agricultural land uses. Chowchilla Bifurcation Structures are used for flood control purposes by the California Department of Water Resources. The normal San Joaquin river flow is released into the San Joaquin river channel. Under flood conditions, the bifurcation dam is opened to spilt the flow between the San Joaquin River channel and the normally dry Chowchilla by-pass channel.

Visual observations were made of the surrounding properties to identify potential sources of environmental concern. Properties in the immediate vicinity of the subject property were observed during the site tour. Land uses in the immediate vicinity of the subject property were mostly agricultural. A small cluster of homes was noted across the road downstream from the Mendota Dam. A public park was noted upstream from the Mendota Dam.

5.3 HAZARDOUS SUBSTANCES AND PETROLEUM PRODUCTS

Potential hazardous materials likely stored and used within the project area include the following categories:

- Historical and currently used herbicides and pesticides.
- Fuels, such as diesel and gasoline.
- Lead-based paint.
- Asbestos containing materials.

- Solvents for solvent plastic-pipe welding.
- Anti-freeze and lubricants for farm equipment and family vehicles.
- Lead acid batteries.
- Fertilizers and other soil amendments.
- Electronic equipment: transformers, transformer oils.

5.4 UNDERGROUND/ABOVEGROUND STORAGE TANKS

URS observed one potential underground storage tank (USTs) vent pipe. The Project area is not listed in the environmental databases as having registered USTs.

5.5 PCB-CONTAINING AND HYDRAULIC EQUIPMENT

One transformer was noted by the farmhouses on the eastern end of the project site. No other transformers were observed by URS on the subject property. A number of electrical service lines were noted on the subject property to service the bifurcation structure, farm houses, and irrigation pumps. No high-tension power lines, utility transmission equipment, or substations were observed on or adjacent to the subject property. Pacific Gas and Electric (PG&E) has removed all PCBs from their system, so only privately-owned old electrical equipment is suspect for PCB containing di-electric fluids.

5.6 SOLID AND HAZARDOUS WASTES

Solid wastes generated by the families that live in the Project area are disposed of by the local garbage company, Madera Disposal Inc.

5.7 DRAINS AND SUMPS

No drains or sumps were observed. Stormwater ditches were observed alongside the roads in the area.

5.8 WASTEWATER

Sanitary wastewater is likely discharged to the homeowners' septic tanks.

5.9 UTILITIES

URS assumes that farm houses use wells for domestic and agricultural water supply. Electric services are provided by PG&E. Most homes in the agricultural area are likely serviced by propane gas for home heating.

5.10 WELLS

A number of agricultural water wells were observed during the site tour. URS assumes that the two to three farm houses are served by wells for drinking water. URS ordered a Well Search

Report from EDR (Attachment C). Numerous state water wells and two state oil and gas wells identified as being located within the Project area. An additional six state oil and gas wells are located within a one mile radius of the Project area.

5.11 PITS, PONDS, AND LAGOONS

No pits, ponds or lagoons were observed on the subject property during the property visit.

5.12 OTHER PHYSICAL EVIDENCE OF CONTAMINATION

No physical evidence of contamination was observed on the subject property during URS' site reconnaissance.

URS has performed a Phase I ESA in conformance with the scope and limitations of ASTM Practice E 1527-05 of the Mendota Pool Bypass and Reach 2B Improvements Project located in the area of the Chowchilla Bifurcation Structures and downstream to Mendota Dam in Mendota, Fresno and Madera Counties, California (subject property). Any exceptions to, or deletions from, this practice are described in Section 1.4 of this report. This assessment has revealed two RECs or HRECs in connection with the subject property:

- Paramount Farming Company at 10317 Eastside Drive in Firebaugh, CA, is located on the northern boundary of the Project area. The site has been identified as having 2.4 tons of asbestos containing waste, and the disposal method is listed as landfill or surface impoundment that will be closed as a landfill (to include on-site treatment and/or stabilization). The site represents a potential environmental concern to the Project area due to the presence of asbestos containing waste.
- Because the Project area was historically used as farmland, pesticide/herbicide residuals may be present in the soil. However, features were not identified (e.g., impoundments, bulk storage facilities or crop dusting air strips) that suggested the handling or storage of significant quantities of pesticides and/or herbicides in the Project area. The Project area represents a historical potential environmental concern to the Project area due to potential for pesticide/herbicide residuals may be present in the soil.

During this assessment, URS identified no significant data gaps in reasonably ascertainable information reviewed and described in this report regarding the Project area, which would be expected to impact our conclusions.

We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in §312.10 of 40 CFR 312 and we have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. We have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

April Ann Giangerelli
Senior Environmental Engineer

Joe Morgan
Senior Project Manager/Senior Reviewer

ASTM, Standard Practice Environmental Site Assessments: *Phase I Environmental Site Assessment Process*, Standard E 1527-05. November 2005.

EDR, The EDR Aerial Photo Decade Package, Inquiry Number 3217783.1s, dated December 8, 2011.

EDR, The EDR Historical Topographic Map Report, Inquiry Number 3196001.2, dated October 31, 2011.

EDR, The EDR DataMap™ Area Study, Inquiry Number 3196001.1s, dated October 31, 2011.

EDR, The EDR DataMap™ Well Search Report, Inquiry Number 3196001.1w, dated December 1, 2011.

EDR, The EDR Sanborn® Map Report – No Coverage, Inquiry Number 3217246.1, dated December 1, 2011.

Attachment A

Regulatory Records Documentation

San Joaquin River Restoration Project Alternatives
Mendota, CA 93640

Inquiry Number: 3196001.1s
October 31, 2011

EDR DataMap™ Area Study

Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

TARGET PROPERTY INFORMATION

ADDRESS

MENDOTA, CA 93640
MENDOTA, CA 93640

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records within the requested search area for the following databases:

FEDERAL RECORDS

NPL	National Priority List
Proposed NPL	Proposed National Priority List Sites
Delisted NPL	National Priority List Deletions
NPL LIENS	Federal Superfund Liens
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CERC-NFRAP	CERCLIS No Further Remedial Action Planned
LIENS 2	CERCLA Lien Information
CORRACTS	Corrective Action Report
RCRA-TSDF	RCRA - Treatment, Storage and Disposal
RCRA-LQG	RCRA - Large Quantity Generators
RCRA-CESQG	RCRA - Conditionally Exempt Small Quantity Generator
RCRA-NonGen	RCRA - Non Generators
US ENG CONTROLS	Engineering Controls Sites List
US INST CONTROL	Sites with Institutional Controls
ERNS	Emergency Response Notification System
HMIRS	Hazardous Materials Information Reporting System
DOT OPS	Incident and Accident Data
US CDL	Clandestine Drug Labs
US BROWNFIELDS	A Listing of Brownfields Sites
DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites
LUCIS	Land Use Control Information System
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
ODI	Open Dump Inventory
MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System

PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
RAATS	RCRA Administrative Action Tracking System
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
US HIST CDL	National Clandestine Laboratory Register
PCB TRANSFORMER	PCB Transformer Registration Database
FEDERAL FACILITY	Federal Facility Site Information listing
COAL ASH DOE	Sleam-Electric Plan Operation Data
FEMA UST	Underground Storage Tank Listing
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List

STATE AND LOCAL RECORDS

HIST Cal-Sites	Historical Calsites Database
CA BOND EXP. PLAN	Bond Expenditure Plan
Toxic Pits	Toxic Pits Cleanup Act Sites
NPDES	NPDES Permits Listing
Cortese	"Cortese" Hazardous Waste & Substances Sites List
HIST CORTESE	Hazardous Waste & Substance Site List
SWRCY	Recycler Database
LUST	Geotracker's Leaking Underground Fuel Tank Report
CA FID UST	Facility Inventory Database
UST	Active UST Facilities
HIST UST	Hazardous Substance Storage Container Database
LIENS	Environmental Liens Listing
SWEEPS UST	SWEEPS UST Listing
CHMIRS	California Hazardous Material Incident Report System
LDS	Land Disposal Sites Listing
MCS	Military Cleanup Sites Listing
Notify 65	Proposition 65 Records
DEED	Deed Restriction Listing
VCP	Voluntary Cleanup Program Properties
DRYCLEANERS	Cleaner Facilities
WIP	Well Investigation Program Case List
CDL	Clandestine Drug Labs
RESPONSE	State Response Sites
HAULERS	Registered Waste Tire Haulers Listing
HWP	EnviroStor Permitted Facilities Listing
MWMP	Medical Waste Management Program Listing
PROC	Certified Processors Database
HWT	Registered Hazardous Waste Transporter Database

TRIBAL RECORDS

INDIAN RESERV	Indian Reservations
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands
INDIAN LUST	Leaking Underground Storage Tanks on Indian Land
INDIAN UST	Underground Storage Tanks on Indian Land
INDIAN VCP	Voluntary Cleanup Priority Listing

EDR PROPRIETARY RECORDS

Manufactured Gas Plants	EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified.

EXECUTIVE SUMMARY

Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

FEDERAL RECORDS

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 06/15/2011 has revealed that there is 1 RCRA-SQG site within the searched area.

Site	Address	Map ID	Page
AES MENDOTA	***400 GUILLEN PARKWAY***	***4***	***5***

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

A review of the FINDS list, as provided by EDR, and dated 04/14/2010 has revealed that there is 1 FINDS site within the searched area.

Site	Address	Map ID	Page
AES MENDOTA	***400 GUILLEN PARKWAY***	***4***	***5***

STATE AND LOCAL RECORDS

SCH: This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category. depending on the level of threat to public health and safety or the. environment they pose.

A review of the SCH list, as provided by EDR, and dated 09/13/2011 has revealed that there is 1 SCH site within the searched area.

Site	Address	Map ID	Page
MENDOTA JUNIOR HIGH SCHOOL SIT	***1200 BELMONT AVENUE***	***5***	***22***

EXECUTIVE SUMMARY

SWF/LF: The Solid Waste Facilities/Landfill Sites records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. The data come from the Integrated Waste Management Board's Solid Waste Information System (SWIS) database.

A review of the SWF/LF list, as provided by EDR, and dated 08/22/2011 has revealed that there is 1 SWF/LF site within the searched area.

Site	Address	Map ID	Page
MENDOTA SOLID WASTE DISPOSAL	1/2 MI E/O BASS AVE BY	2	3

WDS: California Water Resources Control Board - Waste Discharge System.

A review of the WDS list, as provided by EDR, and dated 06/19/2007 has revealed that there is 1 WDS site within the searched area.

Site	Address	Map ID	Page
AES MENDOTA	***400 GUILLEN PARKWAY***	***4***	***5***

WMUDS/SWAT: The Waste Management Unit Database System is used for program tracking and inventory of waste management units. The source is the State Water Resources Control Board.

A review of the WMUDS/SWAT list, as provided by EDR, and dated 04/01/2000 has revealed that there is 1 WMUDS/SWAT site within the searched area.

Site	Address	Map ID	Page
AES MENDOTA	***400 GUILLEN PARKWAY***	***4***	***5***

SLIC: SLIC Region comes from the California Regional Water Quality Control Board.

A review of the SLIC list, as provided by EDR, and dated 09/19/2011 has revealed that there is 1 SLIC site within the searched area.

Site	Address	Map ID	Page
AES MENDOTA	***400 GUILLEN PARKWAY***	***4***	***5***
Facility Status: Open - Site Assessment			

AST: The Aboveground Storage Tank database contains registered ASTs. The data come from the State Water Resources Control Board's Hazardous Substance Storage Container Database.

A review of the AST list, as provided by EDR, and dated 08/01/2009 has revealed that there is 1 AST site within the searched area.

Site	Address	Map ID	Page
AES MENDOTA	***400 GUILLEN PARKWAY***	***4***	***5***

EXECUTIVE SUMMARY

ENF: A listing of Water Board Enforcement Actions. Formal is everything except Oral/Verbal Communication, Notice of Violation, Expedited Payment Letter, and Staff Enforcement Letter.

A review of the ENF list, as provided by EDR, and dated 08/15/2011 has revealed that there is 1 ENF site within the searched area.

Site	Address	Map ID	Page
AES MENDOTA	***400 GUILLEN PARKWAY***	***4***	***5***

HAZNET: The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000-1,000,000 annually, representing approximately 350,000-500,000 shipments. Data from non-California manifests & continuation sheets are not included at the present time. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, & disposal method. The source is the Department of Toxic Substance Control is the agency

A review of the HAZNET list, as provided by EDR, and dated 12/31/2010 has revealed that there are 3 HAZNET sites within the searched area.

Site	Address	Map ID	Page
PARAMOUNT FARMING COMPANY	10317 EASTSIDE DR	1	3
FRANK A LOGOLUSO FARMS	2369 SAN MATEO AVE	3	4
AES MENDOTA	***400 GUILLEN PARKWAY***	***4***	***5***

EMI: Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies

A review of the EMI list, as provided by EDR, and dated 12/31/2008 has revealed that there is 1 EMI site within the searched area.

Site	Address	Map ID	Page
AES MENDOTA	***400 GUILLEN PARKWAY***	***4***	***5***

ENVIROSTOR: The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

A review of the ENVIROSTOR list, as provided by EDR, and dated 09/13/2011 has revealed that there is 1 ENVIROSTOR site within the searched area.

Site	Address	Map ID	Page
MENDOTA JUNIOR HIGH SCHOOL SIT	***1200 BELMONT AVENUE***	***5***	***22***
Status: No Further Action			

EXECUTIVE SUMMARY

Please refer to the end of the findings report for unmapped orphan sites due to poor or inadequate address information.

MAP FINDINGS SUMMARY

Database	Total Plotted
FEDERAL RECORDS	
NPL	0
Proposed NPL	0
Delisted NPL	0
NPL LIENS	0
CERCLIS	0
CERC-NFRAP	0
LIENS 2	0
CORRACTS	0
RCRA-TSDF	0
RCRA-LQG	0
RCRA-SQG	1
RCRA-CESQG	0
RCRA-NonGen	0
US ENG CONTROLS	0
US INST CONTROL	0
ERNS	0
HMIRS	0
DOT OPS	0
US CDL	0
US BROWNFIELDS	0
DOD	0
FUDS	0
LUCIS	0
CONSENT	0
ROD	0
UMTRA	0
DEBRIS REGION 9	0
ODI	0
MINES	0
TRIS	0
TSCA	0
FTTS	0
HIST FTTS	0
SSTS	0
ICIS	0
PADS	0
MLTS	0
RADINFO	0
FINDS	1
RAATS	0
SCRD DRYCLEANERS	0
US HIST CDL	0
PCB TRANSFORMER	0
FEDERAL FACILITY	0
COAL ASH DOE	0
FEMA UST	0
COAL ASH EPA	0
STATE AND LOCAL RECORDS	
HIST Cal-Sites	0

MAP FINDINGS SUMMARY

Database	Total Plotted
CA BOND EXP. PLAN	0
SCH	1
Toxic Pits	0
SWF/LF	1
WDS	1
WMUDS/SWAT	1
NPDES	0
Cortese	0
HIST CORTESE	0
SWRCY	0
LUST	0
CA FID UST	0
SLIC	1
UST	0
HIST UST	0
LIENS	0
SWEEPS UST	0
CHMIRS	0
LDS	0
MCS	0
AST	1
Notify 65	0
DEED	0
VCP	0
DRYCLEANERS	0
WIP	0
CDL	0
ENF	1
RESPONSE	0
HAZNET	3
EMI	1
ENVIROSTOR	1
HAULERS	0
HWP	0
MWMP	0
PROC	0
HWT	0

TRIBAL RECORDS

INDIAN RESERV	0
INDIAN ODI	0
INDIAN LUST	0
INDIAN UST	0
INDIAN VCP	0

EDR PROPRIETARY RECORDS

Manufactured Gas Plants	0

NOTES:

Sites may be listed in more than one database

1 **PARAMOUNT FARMING COMPANY** **HAZNET** **S109931342**
10317 EASTSIDE DR **N/A**
FIREBAUGH, CA 93622

HAZNET:

Year:	2008
Gepaid:	CAC002635016
Contact:	ROY CATANIA
Telephone:	5596591483
Mailing Name:	Not reported
Mailing Address:	10302 AVENUE 7 1/2
Mailing City,St,Zip:	FIREBAUGH, CA 936229611
Gen County:	Fresno
TSD EPA ID:	CAL000190080
TSD County:	San Joaquin
Waste Category:	Asbestos containing waste
Disposal Method:	LANDFILL OR SURFACE IMPOUNDMENT THAT WILL BE CLOSED AS LANDFILL(TO INCLUDE ON-SITE TREATMENT AND/OR STABILIZATION)
Tons:	2.4
Facility County:	Fresno

---

2 **MENDOTA SOLID WASTE DISPOSAL** **SWF/LF** **S102359954**
1/2 MI E/O BASS AVE BY SLOUGH **N/A**
MENDOTA, CA

SWF/LF (SWIS):

Region:	STATE
Facility ID:	10-AA-0008
Lat/Long:	36.4636100 / -120.22168
Owner Name:	County of Fresno Planning & Res. Mgmt.
Owner Telephone:	5592624259
Owner Address:	Not reported
Owner Address2:	2220 Tulare Street, Sixth Floor
Owner City,St,Zip:	Fresno, CA 93721
Operator:	County of Fresno Planning & Res. Mgmt.
Operator Phone:	5592624259
Operator Address:	Not reported
Operator Address2:	2220 Tulare Street, Sixth Floor
Operator City,St,Zip:	Fresno, CA 93721
Operator's Status:	Clean Closed
Permit Date:	Not reported
Permit Status:	Not reported
Permitted Acreage:	0
Activity:	Solid Waste Disposal Site
Regulation Status:	Permitted
Landuse Name:	Not reported
GIS Source:	Map
Category:	Disposal
Unit Number:	01
Inspection Frequency:	None
Accepted Waste:	Not reported
Closure Date:	12/31/1981
Closure Type:	Estimated
Disposal Acreage:	0
SWIS Num:	10-AA-0008
Waste Discharge Requirement Num:	Not reported
Program Type:	Not reported
Permitted Throughput with Units:	Not reported
Actual Throughput with Units:	Not reported
Permitted Capacity with Units:	Not reported

MENDOTA SOLID WASTE DISPOSAL (Continued) **S102359954**

Remaining Capacity: Not reported
Remaining Capacity with Units: Not reported

Region: STATE
Facility ID: 10-AA-0008
Lat/Long: 36.4636100 / -120.22168
Owner Name: County of Fresno Planning & Res. Mgmt.
Owner Telephone: 5592624259
Owner Address: Not reported
Owner Address2: 2220 Tulare Street, Sixth Floor
Owner City,St,Zip: Fresno, CA 93721
Operator: County of Fresno Planning & Res. Mgmt.
Operator Phone: 5592624259
Operator Address: Not reported
Operator Address2: 2220 Tulare Street, Sixth Floor
Operator City,St,Zip: Fresno, CA 93721
Operator's Status: Closed
Permit Date: Not reported
Permit Status: Not reported
Permitted Acreage: 0
Activity: Large Volume Transfer/Proc Facility
Regulation Status: Surrendered
Landuse Name: Not reported
GIS Source: Map
Category: Transfer/Processing
Unit Number: 02
Inspection Frequency: None
Accepted Waste: Not reported
Closure Date: Not reported
Closure Type: Not reported
Disposal Acreage: Not reported
SWIS Num: 10-AA-0008
Waste Discharge Requirement Num: Not reported
Program Type: Not reported
Permitted Throughput with Units: 0
Actual Throughput with Units: Not reported
Permitted Capacity with Units: 0
Remaining Capacity: Not reported
Remaining Capacity with Units: Not reported

---

3 **FRANK A LOGOLUSO FARMS** **HAZNET** **S103644753**
2369 SAN MATEO AVE **N/A**
MENDOTA, CA 93640

HAZNET:
Year: 1996
Gepaid: CAL000124122
Contact: FRANK A LOGOLUSO FARMS
Telephone: 2096748897
Mailing Name: Not reported
Mailing Address: 7567 ROAD 28
Mailing City,St,Zip: MADERA, CA 936379129
Gen County: Fresno
TSD EPA ID: CAD980887418
TSD County: 1
Waste Category: Waste oil and mixed oil
Disposal Method: R01
Tons: .3753

FRANK A LOGOLUSO FARMS (Continued) **S103644753**

Facility County: Fresno

---

4 **AES MENDOTA** **RCRA-SQG** **1000191755**
400 GUILLEN PARKWAY **FINDS** **CAD982397606**
MENDOTA, CA 93640 **WMUDS/SWAT**
WDS
SLIC
CUPA Listings
AST
ENF
HAZNET
EMI

RCRA-SQG:

Date form received by agency:	09/01/1996
Facility name:	MENDOTA BIOMASS POWER
Facility address:	400 GUILLEN PKWY MENDOTA, CA 93640
EPA ID:	CAD982397606
Mailing address:	PO BOX 99 MENDOTA, CA 93640
Contact:	Not reported
Contact address:	Not reported Not reported
Contact country:	Not reported
Contact telephone:	Not reported
Contact email:	Not reported
EPA Region:	09
Classification:	Small Small Quantity Generator
Description:	Handler: generates more than 100 and less than 1000 kg of hazardous waste during any calendar month and accumulates less than 6000 kg of hazardous waste at any time; or generates 100 kg or less of hazardous waste during any calendar month, and accumulates more than 1000 kg of hazardous waste at any time

Owner/Operator Summary:

Owner/operator name:	THERMO-ELECTRON
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported
Owner/operator name:	NOT REQUIRED
Owner/operator address:	NOT REQUIRED NOT REQUIRED, ME 99999
Owner/operator country:	Not reported
Owner/operator telephone:	(415) 555-1212
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	Not reported
Owner/Op end date:	Not reported

AES MENDOTA (Continued) **1000191755**

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

Historical Generators:

Date form received by agency:	04/24/1990
Facility name:	MENDOTA BIOMASS POWER
Classification:	Large Quantity Generator

Violation Status: No violations found

FINDS:

Registry ID: 110000524077

Environmental Interest/Information System
Not reported

AFS (Aerometric Information Retrieval System (AIRS) Facility Subsystem) replaces the former Compliance Data System (CDS), the National Emission Data System (NEDS), and the Storage and Retrieval of Aerometric Data (SAROAD). AIRS is the national repository for information concerning airborne pollution in the United States. AFS is used to track emissions and compliance data from industrial plants. AFS data are utilized by states to prepare State Implementation Plans to comply with regulatory programs and by EPA as an input for the estimation of total national emissions. AFS is undergoing a major redesign to support facility operating permits required under Title V of the Clean Air Act.

The NEI (National Emissions Inventory) database contains information on stationary and mobile sources that emit criteria air pollutants and their precursors, as well as hazardous air pollutants (HAPs).

US Emissions & Generation Resource Database (EGRID) contains data on emissions and resource mix for virtually every power plant and company that generates electricity in the United States.

RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

AES MENDOTA (Continued) **1000191755**

US EPA Risk Management Plan (RMP) database stores the risk management plans reported by companies that handle, manufacture, use, or store certain flammable or toxic substances, as required under section 112(r) of the Clean Air Act (CAA).

WMUDS/SWAT:

Edit Date:	Not reported
Complexity:	Category B - Any facility having a physical, chemical, or biological waste treatment system (except for septic systems with subsurface disposal), or any Class II or III disposal site, or facilities without treatment systems that are complex, such as marinas with petroleum products, solid wastes, and sewage pump out facilities.
Primary Waste:	Process Waste (Waste produced as part of the industrial/manufacturing process)
Primary Waste Type:	Designated/Influent or Solid Wastes that pose a significant threat to water quality because of their high concentrations (E.G., BOD, Hardness, TRF, Chloride). 'Manageable' hazardous wastes (E.G., inorganic salts and heavy metals) are included in this category.
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Base Meridian:	Not reported
NPID:	Not reported
Tonnage:	0
Regional Board ID:	Not reported
Municipal Solid Waste:	False
Superorder:	False
Open To Public:	False
Waste List:	False
Agency Type:	Private
Agency Name:	MENDOTA BIOMASS POWER, LTD
Agency Department:	Not reported
Agency Address:	PO BOX 99
Agency City,St,Zip:	MENDOTA CA 93640
Agency Contact:	GLENN SIZEMORE
Agency Telephone:	5596554921
Land Owner Name:	Not reported
Land Owner Address:	Not reported
Land Owner City,St,Zip:	Not reported
Land Owner Contact:	Not reported
Land Owner Phone:	Not reported
Region:	5F
Facility Type:	Industrial - Facility that treats and/or disposes of liquid or semisolid wastes from any servicing, producing, manufacturing or processing operation of whatever nature, including mining, gravel washing, geothermal operations, air conditioning, ship building and repairing, oil production, storage and disposal operations, water pumping.
Facility Description:	Not reported
Facility Telephone:	Not reported
SWAT Facility Name:	Not reported
Primary SIC:	4931
Secondary SIC:	Not reported
Comments:	Not reported
Last Facility Editors:	Not reported
Waste Discharge System:	True
Solid Waste Assessment Test Program:	False

AES MENDOTA (Continued) **1000191755**

Toxic Pits Cleanup Act Program:	False
Resource Conservation Recovery Act:	False
Department of Defence:	False
Solid Waste Assessment Test Program:	Not reported
Threat to Water Quality:	Moderate Threat to Water Quality. A violation could have a major adverse impact on receiving biota, can cause aesthetic impairment to a significant human population, or render unusable a potential domestic or municipal water supply. Awsthetic impairment would include nuisance from a waste treatment facility.
Sub Chapter 15:	True
Regional Board Project Officer:	ESB
Number of WMUDS at Facility:	1
Section Range:	Not reported
RCRA Facility:	No
Waste Discharge Requirements:	Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
Self-Monitoring Rept. Frequency:	Monthly Submittal
Waste Discharge System ID:	5D100137001
Solid Waste Information ID:	Not reported

CA WDS:

Facility ID:	Tulare Lake 100137001
Facility Type:	Industrial - Facility that treats and/or disposes of liquid or semisolid wastes from any servicing, producing, manufacturing or processing operation of whatever nature, including mining, gravel washing, geothermal operations, air conditioning, ship building and repairing, oil production, storage and disposal operations, water pumping.
Facility Status:	Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
NPDES Number:	Not reported
Subregion:	0
Facility Telephone:	Not reported
Facility Contact:	DOUG TOMISON
Agency Name:	AES MENDOTA INC
Agency Address:	PO BOX 99
Agency City,St,Zip:	MENDOTA 93640
Agency Contact:	GLENN SIZEMORE
Agency Telephone:	Not reported
Agency Type:	Private
SIC Code:	4931
SIC Code 2:	Not reported
Primary Waste:	Process Waste (Waste produced as part of the industrial/manufacturing process)
Primary Waste Type:	Designated/Influent or Solid Wastes that pose a significant threat to water quality because of their high concentrations (E.G., BOD, Hardness, TRF, Chloride). 'Manageable' hazardous wastes (E.G., inorganic salts and heavy metals) are included in this category.
Secondary Waste:	Not reported
Secondary Waste Type:	Not reported
Design Flow:	0
Baseline Flow:	0
Reclamation:	No reclamation requirements associated with this facility.
POTW:	The facility is not a POTW.
Treat To Water:	Moderate Threat to Water Quality. A violation could have a major adverse impact on receiving biota, can cause aesthetic impairment to a significant human population, or render unusable a potential domestic

AES MENDOTA (Continued) **1000191755**

or municipal water supply. Awsthetic impairment would include nuisance from a waste treatment facility.

Complexity: Category B - Any facility having a physical, chemical, or biological waste treatment system (except for septic systems with subsurface disposal), or any Class II or III disposal site, or facilities without treatment systems that are complex, such as marinas with petroleum products, solid wastes, and sewage pump out facilities.

SLIC:

Region:	STATE
Facility Status:	**Open - Site Assessment**
Status Date:	04/20/2010
Global Id:	SLT5FS604625
Lead Agency:	CENTRAL VALLEY RWQCB (REGION 5F)
Lead Agency Case Number:	Not reported
Latitude:	36.7548
Longitude:	-120.379
Case Type:	Cleanup Program Site
Case Worker:	GJI
Local Agency:	Not reported
RB Case Number:	SLT5FS060
File Location:	Not reported
Potential Media Affected:	Not reported
Potential Contaminants of Concern:	Not reported
Site History:	The case was opened following an unauthorized release from an underground storage tank system at the subject site. Corrective action is underway as directed by the CVRWQCB. Corrective action may consist of preliminary site investigation, planning and implementation of remedial action, verification monitoring, or a combination thereof. A summary of the site history is available by clicking on either the "Cleanup Status History", "Regulatory Activities" or the "Site Maps/Documents" tab. For a complete site history the case file at the CVRWQCB should be consulted.

Click here to access the California GeoTracker records for this facility:

CUPA FRESNO:

Region:	FRESNO
Cross Street:	BELMONT ALLIGNMENT
Facility ID:	FA0271781
APM Number:	013-030-61S
Owner Name:	COVANTA MENDOTA LP
Program Element:	LARGE HAZARDOUS MATERIALS HANDLER

Region:	FRESNO
Cross Street:	BELMONT ALLIGNMENT
Facility ID:	FA0271781
APM Number:	013-030-61S
Owner Name:	COVANTA MENDOTA LP
Program Element:	CONTAMINATED SITE - MISC/RWQCB LEAD

Region:	FRESNO
Cross Street:	BELMONT ALLIGNMENT
Facility ID:	FA0271781
APM Number:	013-030-61S
Owner Name:	COVANTA MENDOTA LP

AES MENDOTA (Continued) **1000191755**

Program Element: EXTREMELY HAZARDOUS SUBSTANCE HANDLER (EPCRA)

Region: FRESNO
Cross Street: BELMONT ALLIGNMENT
Facility ID: FA0271781
APM Number: 013-030-61S
Owner Name: COVANTA MENDOTA LP
Program Element: AST STORAGE CAPACITY 1,320 TO 9,999 GAL

Region: FRESNO
Cross Street: BELMONT ALLIGNMENT
Facility ID: FA0271781
APM Number: 013-030-61S
Owner Name: COVANTA MENDOTA LP
Program Element: HAZARDOUS WASTE GENERATOR (LQG)

Region: FRESNO
Cross Street: BELMONT ALLIGNMENT
Facility ID: FA0271781
APM Number: 013-030-61S
Owner Name: COVANTA MENDOTA LP
Program Element: CALARP RMP FACILITY

AST:
Owner: COVANTA MENDOTA LP
Total Gallons: 1,320
Certified Unified Program Agencies: Fresno

ENF:
Region: 5F
Facility Id: 204599
Agency Name: AES MENDOTA, INC
Place Type: Facility
Place Subtype: Not reported
Facility Type: Industrial
Agency Type: Privately-Owned Business
Of Agencies: 1
Place Latitude: Not reported
Place Longitude: Not reported
SIC Code 1: 4931
SIC Desc 1: Electric and Other Services Combined
SIC Code 2: Not reported
SIC Desc 2: Not reported
SIC Code 3: Not reported
SIC Desc 3: Not reported
NAICS Code 1: Not reported
NAICS Desc 1: Not reported
NAICS Code 2: Not reported
NAICS Desc 2: Not reported
NAICS Code 3: Not reported
NAICS Desc 3: Not reported
Of Places: 1
Source Of Facility: Reg Meas
Design Flow: 7.00000000
Threat To Water Quality: 2
Complexity: B

AES MENDOTA (Continued) **1000191755**

Pretreatment:	X - Facility is not a POTW
Facility Waste Type:	Designated process waste
Facility Waste Type 2:	Not reported
Facility Waste Type 3:	Not reported
Facility Waste Type 4:	Not reported
Program:	LNDISP
# Of Programs:	1
WDID:	5D100137001
Reg Measure Id:	146331
Reg Measure Type:	WDR
Region:	5F
Order #:	97-135
Npdes# CA#:	Not reported
Major-Minor:	Not reported
Npdes Type:	Not reported
Reclamation:	N - No
Dredge Fill Fee:	Not reported
301H:	Not reported
Application Fee Amt Received:	Not reported
Status:	Active
Status Date:	03/02/2010
Effective Date:	06/20/1997
Expiration/Review Date:	06/18/2007
Termination Date:	Not reported
WDR Review - Amend:	Not reported
WDR Review - Revise/Renew:	Not reported
WDR Review - Rescind:	Not reported
WDR Review - No Action Required:	Not reported
WDR Review - Pending:	Not reported
WDR Review - Planned:	Not reported
Status Enrollee:	N
Individual/General:	I
Fee Code:	59 - Land Disposal Site not paying tipping fee
Direction/Voice:	Passive
Enforcement Id(EID):	252598
Region:	5F
Order / Resolution Number:	Not reported
Enforcement Action Type:	Notice of Violation
Effective Date:	04/12/2004
Adoption/Issuance Date:	Not reported
Achieve Date:	Not reported
Termination Date:	Not reported
ACL Issuance Date:	Not reported
EPL Issuance Date:	Not reported
Status:	Historical
Title:	NOV 04/12/2004 for AES Mendota Covanta Mendota LP
Description:	NOV issued for numerous vilolations of the WDRs...freeboard level less than 2 feet, primary liner leaking, and unautorized discharge to land from sprayer.
Program:	LNDISP
Latest Milestone Completion Date:	Not reported
# Of Programs1:	1
Total Assessment Amount:	0
Initial Assessed Amount:	0
Liability $ Amount:	0
Project $ Amount:	0
Liability $ Paid:	0

AES MENDOTA (Continued) **1000191755**

Project $ Completed:	0
Total $ Paid/Completed Amount:	0
Region:	5F
Facility Id:	204599
Agency Name:	AES MENDOTA, INC
Place Type:	Facility
Place Subtype:	Not reported
Facility Type:	Industrial
Agency Type:	Privately-Owned Business
# Of Agencies:	1
Place Latitude:	Not reported
Place Longitude:	Not reported
SIC Code 1:	4931
SIC Desc 1:	Electric and Other Services Combined
SIC Code 2:	Not reported
SIC Desc 2:	Not reported
SIC Code 3:	Not reported
SIC Desc 3:	Not reported
NAICS Code 1:	Not reported
NAICS Desc 1:	Not reported
NAICS Code 2:	Not reported
NAICS Desc 2:	Not reported
NAICS Code 3:	Not reported
NAICS Desc 3:	Not reported
# Of Places:	1
Source Of Facility:	Reg Meas
Design Flow:	7.00000000
Threat To Water Quality:	2
Complexity:	B
Pretreatment:	X - Facility is not a POTW
Facility Waste Type:	Designated process waste
Facility Waste Type 2:	Not reported
Facility Waste Type 3:	Not reported
Facility Waste Type 4:	Not reported
Program:	LNDISP
# Of Programs:	1
WDID:	5D100137001
Reg Measure Id:	146331
Reg Measure Type:	WDR
Region:	5F
Order #:	97-135
Npdes# CA#:	Not reported
Major-Minor:	Not reported
Npdes Type:	Not reported
Reclamation:	N - No
Dredge Fill Fee:	Not reported
301H:	Not reported
Application Fee Amt Received:	Not reported
Status:	Active
Status Date:	03/02/2010
Effective Date:	06/20/1997
Expiration/Review Date:	06/18/2007
Termination Date:	Not reported
WDR Review - Amend:	Not reported
WDR Review - Revise/Renew:	Not reported
WDR Review - Rescind:	Not reported

AES MENDOTA (Continued) **1000191755**

WDR Review - No Action Required:	Not reported
WDR Review - Pending:	Not reported
WDR Review - Planned:	Not reported
Status Enrollee:	N
Individual/General:	I
Fee Code:	59 - Land Disposal Site not paying tipping fee
Direction/Voice:	Passive
Enforcement Id(EID):	229976
Region:	5F
Order / Resolution Number:	UNKNOWN
Enforcement Action Type:	Notice of Violation
Effective Date:	09/15/2000
Adoption/Issuance Date:	Not reported
Achieve Date:	Not reported
Termination Date:	09/15/2000
ACL Issuance Date:	Not reported
EPL Issuance Date:	Not reported
Status:	Historical
Title:	Enforcement - 5D100137001
Description:	NOV ON 8/24/2000 REPORT "WORKPLAN TO ADDRESS NOV 6/26/00 BY GEOLOGICAL TECHNICS, INC" REQUESTING ADDITIONAL DOCUMENTATION FOR CONCRETE COVE
Program:	LNDISP
Latest Milestone Completion Date:	Not reported
# Of Programs1:	1
Total Assessment Amount:	0
Initial Assessed Amount:	0
Liability $ Amount:	0
Project $ Amount:	0
Liability $ Paid:	0
Project $ Completed:	0
Total $ Paid/Completed Amount:	0

Region:	5F
Facility Id:	204599
Agency Name:	AES MENDOTA, INC
Place Type:	Facility
Place Subtype:	Not reported
Facility Type:	Industrial
Agency Type:	Privately-Owned Business
# Of Agencies:	1
Place Latitude:	Not reported
Place Longitude:	Not reported
SIC Code 1:	4931
SIC Desc 1:	Electric and Other Services Combined
SIC Code 2:	Not reported
SIC Desc 2:	Not reported
SIC Code 3:	Not reported
SIC Desc 3:	Not reported
NAICS Code 1:	Not reported
NAICS Desc 1:	Not reported
NAICS Code 2:	Not reported
NAICS Desc 2:	Not reported
NAICS Code 3:	Not reported
NAICS Desc 3:	Not reported
# Of Places:	1
Source Of Facility:	Reg Meas
Design Flow:	7.00000000

AES MENDOTA (Continued) **1000191755**

Threat To Water Quality:	2
Complexity:	B
Pretreatment:	X - Facility is not a POTW
Facility Waste Type:	Designated process waste
Facility Waste Type 2:	Not reported
Facility Waste Type 3:	Not reported
Facility Waste Type 4:	Not reported
Program:	LNDISP
# Of Programs:	1
WDID:	5D100137001
Reg Measure Id:	146331
Reg Measure Type:	WDR
Region:	5F
Order #:	97-135
Npdes# CA#:	Not reported
Major-Minor:	Not reported
Npdes Type:	Not reported
Reclamation:	N - No
Dredge Fill Fee:	Not reported
301H:	Not reported
Application Fee Amt Received:	Not reported
Status:	Active
Status Date:	03/02/2010
Effective Date:	06/20/1997
Expiration/Review Date:	06/18/2007
Termination Date:	Not reported
WDR Review - Amend:	Not reported
WDR Review - Revise/Renew:	Not reported
WDR Review - Rescind:	Not reported
WDR Review - No Action Required:	Not reported
WDR Review - Pending:	Not reported
WDR Review - Planned:	Not reported
Status Enrollee:	N
Individual/General:	I
Fee Code:	59 - Land Disposal Site not paying tipping fee
Direction/Voice:	Passive
Enforcement Id(EID):	229488
Region:	5F
Order / Resolution Number:	UNKNOWN
Enforcement Action Type:	Notice of Violation
Effective Date:	06/26/2000
Adoption/Issuance Date:	Not reported
Achieve Date:	9/15/2000
Termination Date:	06/26/2000
ACL Issuance Date:	Not reported
EPL Issuance Date:	Not reported
Status:	Historical
Title:	Enforcement - 5D100137001
Description:	Since June 1999, electrical conductance, total dissolved solids, chloride, and sulfate concentrations in a downgradient well (MW-2) have increased (doubled) to above background levels. This violates sections A.2, B.2 and B.6 of the WDRs.
Program:	LNDISP
Latest Milestone Completion Date:	09/15/2000
# Of Programs1:	1
Total Assessment Amount:	0
Initial Assessed Amount:	0

AES MENDOTA (Continued) **1000191755**

Liability $ Amount:	0
Project $ Amount:	0
Liability $ Paid:	0
Project $ Completed:	0
Total $ Paid/Completed Amount:	0
Region:	5F
Facility Id:	204599
Agency Name:	AES MENDOTA, INC
Place Type:	Facility
Place Subtype:	Not reported
Facility Type:	Industrial
Agency Type:	Privately-Owned Business
# Of Agencies:	1
Place Latitude:	Not reported
Place Longitude:	Not reported
SIC Code 1:	4931
SIC Desc 1:	Electric and Other Services Combined
SIC Code 2:	Not reported
SIC Desc 2:	Not reported
SIC Code 3:	Not reported
SIC Desc 3:	Not reported
NAICS Code 1:	Not reported
NAICS Desc 1:	Not reported
NAICS Code 2:	Not reported
NAICS Desc 2:	Not reported
NAICS Code 3:	Not reported
NAICS Desc 3:	Not reported
# Of Places:	1
Source Of Facility:	Reg Meas
Design Flow:	7.00000000
Threat To Water Quality:	2
Complexity:	B
Pretreatment:	X - Facility is not a POTW
Facility Waste Type:	Designated process waste
Facility Waste Type 2:	Not reported
Facility Waste Type 3:	Not reported
Facility Waste Type 4:	Not reported
Program:	LNDISP
# Of Programs:	1
WDID:	5D100137001
Reg Measure Id:	146331
Reg Measure Type:	WDR
Region:	5F
Order #:	97-135
Npdes# CA#:	Not reported
Major-Minor:	Not reported
Npdes Type:	Not reported
Reclamation:	N - No
Dredge Fill Fee:	Not reported
301H:	Not reported
Application Fee Amt Received:	Not reported
Status:	Active
Status Date:	03/02/2010
Effective Date:	06/20/1997
Expiration/Review Date:	06/18/2007
Termination Date:	Not reported

AES MENDOTA (Continued) **1000191755**

WDR Review - Amend:	Not reported
WDR Review - Revise/Renew:	Not reported
WDR Review - Rescind:	Not reported
WDR Review - No Action Required:	Not reported
WDR Review - Pending:	Not reported
WDR Review - Planned:	Not reported
Status Enrollee:	N
Individual/General:	I
Fee Code:	59 - Land Disposal Site not paying tipping fee
Direction/Voice:	Passive
Enforcement Id(EID):	228786
Region:	5F
Order / Resolution Number:	UNKNOWN
Enforcement Action Type:	Notice of Violation
Effective Date:	06/12/2000
Adoption/Issuance Date:	Not reported
Achieve Date:	9/15/2000
Termination Date:	06/12/2000
ACL Issuance Date:	Not reported
EPL Issuance Date:	Not reported
Status:	Historical
Title:	Enforcement - 5D100137001
Description:	There were five violations of the WDR Order No. 97-135.
Program:	LNDISP
Latest Milestone Completion Date:	09/15/2000
# Of Programs1:	1
Total Assessment Amount:	0
Initial Assessed Amount:	0
Liability $ Amount:	0
Project $ Amount:	0
Liability $ Paid:	0
Project $ Completed:	0
Total $ Paid/Completed Amount:	0

HAZNET:

Year:	2000
Gepaid:	CAD982397606
Contact:	MENDOTA BIOMASS POWER
Telephone:	0000000000
Mailing Name:	Not reported
Mailing Address:	PO BOX 99
Mailing City,St,Zip:	MENDOTA, CA 936400099
Gen County:	Fresno
TSD EPA ID:	CAD980673842
TSD County:	Fresno
Waste Category:	Waste oil and mixed oil
Disposal Method:	R01
Tons:	1.2718
Facility County:	Fresno

Year:	1999
Gepaid:	CAD982397606
Contact:	MENDOTA BIOMASS POWER
Telephone:	0000000000
Mailing Name:	Not reported
Mailing Address:	PO BOX 99
Mailing City,St,Zip:	MENDOTA, CA 936400099

AES MENDOTA (Continued) **1000191755**

Gen County: Fresno
TSD EPA ID: CAD980673842
TSD County: Fresno
Waste Category: Waste oil and mixed oil
Disposal Method: R01
Tons: 0.3336
Facility County: Fresno

Year: 1999
Gepaid: CAD982397606
Contact: MENDOTA BIOMASS POWER
Telephone: 0000000000
Mailing Name: Not reported
Mailing Address: PO BOX 99
Mailing City,St,Zip: MENDOTA, CA 936400099
Gen County: Fresno
TSD EPA ID: CAD093459485
TSD County: Fresno
Waste Category: Aqueous solution with total organic residues less than 10 percent
Disposal Method: T01
Tons: 0.6545
Facility County: Fresno

Year: 1999
Gepaid: CAD982397606
Contact: MENDOTA BIOMASS POWER
Telephone: 0000000000
Mailing Name: Not reported
Mailing Address: PO BOX 99
Mailing City,St,Zip: MENDOTA, CA 936400099
Gen County: Fresno
TSD EPA ID: CAD066113465
TSD County: Fresno
Waste Category: Liquids with halogenated organic compounds >= 1,000 Mg./L
Disposal Method: H01
Tons: 0.1328
Facility County: Fresno

Year: 1999
Gepaid: CAD982397606
Contact: MENDOTA BIOMASS POWER
Telephone: 0000000000
Mailing Name: Not reported
Mailing Address: PO BOX 99
Mailing City,St,Zip: MENDOTA, CA 936400099
Gen County: Fresno
TSD EPA ID: CAD066113465
TSD County: Fresno
Waste Category: Hydrocarbon solvents (benzene, hexane, Stoddard, Etc.)
Disposal Method: H01
Tons: 0.0417
Facility County: Fresno

Click this hyperlink while viewing on your computer to access
16 additional CA_HAZNET: record(s) in the EDR Site Report.

AES MENDOTA (Continued) **1000191755**

EMI:

Year:	1990
County Code:	10
Air Basin:	SJV
Facility ID:	132
Air District Name:	SJU
SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	5
NOX - Oxides of Nitrogen Tons/Yr:	18
SOX - Oxides of Sulphur Tons/Yr:	1
Particulate Matter Tons/Yr:	4
Part. Matter 10 Micrometers & Smllr Tons/Yr:	4

Year:	1995
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU
SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	1
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	5
NOX - Oxides of Nitrogen Tons/Yr:	74
SOX - Oxides of Sulphur Tons/Yr:	12
Particulate Matter Tons/Yr:	4
Part. Matter 10 Micrometers & Smllr Tons/Yr:	4

Year:	1996
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU
SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	7
NOX - Oxides of Nitrogen Tons/Yr:	176
SOX - Oxides of Sulphur Tons/Yr:	7
Particulate Matter Tons/Yr:	23
Part. Matter 10 Micrometers & Smllr Tons/Yr:	23

Year:	1997
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU

AES MENDOTA (Continued) **1000191755**

SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	7
NOX - Oxides of Nitrogen Tons/Yr:	176
SOX - Oxides of Sulphur Tons/Yr:	7
Particulate Matter Tons/Yr:	23
Part. Matter 10 Micrometers & Smllr Tons/Yr:	23

Year:	1998
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU
SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	1
NOX - Oxides of Nitrogen Tons/Yr:	89
SOX - Oxides of Sulphur Tons/Yr:	7
Particulate Matter Tons/Yr:	24
Part. Matter 10 Micrometers & Smllr Tons/Yr:	10

Year:	1999
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU
SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	1
NOX - Oxides of Nitrogen Tons/Yr:	89
SOX - Oxides of Sulphur Tons/Yr:	7
Particulate Matter Tons/Yr:	24
Part. Matter 10 Micrometers & Smllr Tons/Yr:	10

Year:	2000
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU
SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0

AES MENDOTA (Continued) **1000191755**

Carbon Monoxide Emissions Tons/Yr:	1
NOX - Oxides of Nitrogen Tons/Yr:	83
SOX - Oxides of Sulphur Tons/Yr:	7
Particulate Matter Tons/Yr:	22
Part. Matter 10 Micrometers & Smllr Tons/Yr:	9

Year:	2001
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU
SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	0
NOX - Oxides of Nitrogen Tons/Yr:	1
SOX - Oxides of Sulphur Tons/Yr:	0
Particulate Matter Tons/Yr:	0
Part. Matter 10 Micrometers & Smllr Tons/Yr:	0

Year:	2002
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU
SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	50
NOX - Oxides of Nitrogen Tons/Yr:	86
SOX - Oxides of Sulphur Tons/Yr:	26
Particulate Matter Tons/Yr:	52
Part. Matter 10 Micrometers & Smllr Tons/Yr:	52

Year:	2003
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU
SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0
Reactive Organic Gases Tons/Yr:	0
Carbon Monoxide Emissions Tons/Yr:	62
NOX - Oxides of Nitrogen Tons/Yr:	83
SOX - Oxides of Sulphur Tons/Yr:	31
Particulate Matter Tons/Yr:	77
Part. Matter 10 Micrometers & Smllr Tons/Yr:	71

AES MENDOTA (Continued) **1000191755**

Year:	2004
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU
SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	0.276114422
Reactive Organic Gases Tons/Yr:	0.12177605
Carbon Monoxide Emissions Tons/Yr:	55.73815284
NOX - Oxides of Nitrogen Tons/Yr:	75.48011792
SOX - Oxides of Sulphur Tons/Yr:	27.9003685
Particulate Matter Tons/Yr:	68.72582068
Part. Matter 10 Micrometers & Smllr Tons/Yr:	63.89397491

Year:	2005
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU
SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.2345698687225337741
Reactive Organic Gases Tons/Yr:	.1042701997248530028
Carbon Monoxide Emissions Tons/Yr:	51.96744619305074169
NOX - Oxides of Nitrogen Tons/Yr:	69.85207737469226256
SOX - Oxides of Sulphur Tons/Yr:	26.1267281000302732
Particulate Matter Tons/Yr:	64.18002994927866003
Part. Matter 10 Micrometers & Smllr Tons/Yr:	59.71721785946688412

Year:	2006
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU
SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Not reported
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.2715960105555591717
Reactive Organic Gases Tons/Yr:	.1220018361385613667
Carbon Monoxide Emissions Tons/Yr:	60.1928263620197769
NOX - Oxides of Nitrogen Tons/Yr:	80.86750666298329347
SOX - Oxides of Sulphur Tons/Yr:	30.26499244974881405
Particulate Matter Tons/Yr:	75.29595526847092773
Part. Matter 10 Micrometers & Smllr Tons/Yr:	69.74724560940672398

Year:	2007
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU
SIC Code:	4911

AES MENDOTA (Continued) **1000191755**

Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Y
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.2367910684810350593
Reactive Organic Gases Tons/Yr:	.1045024150999560645
Carbon Monoxide Emissions Tons/Yr:	58.36940225311964723
NOX - Oxides of Nitrogen Tons/Yr:	77.90412926190018612
SOX - Oxides of Sulphur Tons/Yr:	29.47646494990810751
Particulate Matter Tons/Yr:	75.30802889770689987
Part. Matter 10 Micrometers & Smllr Tons/Yr:	69.13831059024175644

Year:	2007
County Code:	10
Air Basin:	SJV
Facility ID:	825
Air District Name:	SJU
SIC Code:	4911
Air District Name:	SAN JOAQUIN VALLEY UNIFIED APCD
Community Health Air Pollution Info System:	Y
Consolidated Emission Reporting Rule:	Not reported
Total Organic Hydrocarbon Gases Tons/Yr:	.2555474599032630680
Reactive Organic Gases Tons/Yr:	.1169080102593750096
Carbon Monoxide Emissions Tons/Yr:	60.94248887153267912
NOX - Oxides of Nitrogen Tons/Yr:	81.35514172959387212
SOX - Oxides of Sulphur Tons/Yr:	30.77307991488784551
Particulate Matter Tons/Yr:	75.21064274262712088
Part. Matter 10 Micrometers & Smllr Tons/Yr:	70.10691789553342343

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5 **MENDOTA JUNIOR HIGH SCHOOL SITE** **SCH** **S107736720**
1200 BELMONT AVENUE **ENVIROSTOR** **N/A**
MENDOTA, CA 93640

SCH:

Facility ID:	70000137
Site Type:	School Investigation
Site Type Detail:	School
Site Mgmt. Req.:	NONE SPECIFIED
Acres:	23
National Priorities List:	NO
Cleanup Oversight Agencies:	SMBRP
Lead Agency:	SMBRP
Lead Agency Description:	DTSC - Site Mitigation And Brownfield Reuse Program
Project Manager:	Not reported
Supervisor:	Javier Hinojosa
Division Branch:	Northern California Schools & Santa Susana
Site Code:	104514
Assembly:	31
Senate:	16
Special Program Status:	EPA - Target Site Investigation
Status:	No Further Action
Status Date:	05/22/2006
Restricted Use:	NO
Funding:	EPA Grant
Latitude:	36.7475
Longitude:	-120.3812
APN:	019-06-103
Past Use:	AGRICULTURAL - ROW CROPS

MENDOTA JUNIOR HIGH SCHOOL SITE (Continued) **S107736720**

Potential COC:	30181, 30440
Confirmed COC:	NONE SPECIFIED
Potential Description:	IA, SOIL, SV
Alias Name:	019-06-103
Alias Type:	APN
Alias Name:	104514
Alias Type:	Project Code (Site Code)
Alias Name:	70000122
Alias Type:	Envirostor ID Number
Alias Name:	70000137
Alias Type:	Envirostor ID Number

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Preliminary Endangerment Assessment Workplan
Completed Date:	2006-02-24 00:00:00
Comments:	Not reported

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Preliminary Endangerment Assessment Report
Completed Date:	2006-05-22 00:00:00
Comments:	Approval of final PEA report.

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Cost Recovery Closeout Memo
Completed Date:	2006-12-07 00:00:00
Comments:	Not reported

Future Area Name:	Not reported
Future Sub Area Name:	Not reported
Future Document Type:	Not reported
Future Due Date:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported
Schedule Revised Date:	Not reported

ENVIROSTOR:

Site Type:	School Investigation
Site Type Detailed:	School
Acres:	23
NPL:	NO
Regulatory Agencies:	SMBRP
Lead Agency:	SMBRP
Program Manager:	Not reported
Supervisor:	Javier Hinojosa
Division Branch:	Northern California Schools & Santa Susana
Facility ID:	70000137
Site Code:	104514
Assembly:	31
Senate:	16
Special Program:	EPA - Target Site Investigation
Status:	No Further Action

MENDOTA JUNIOR HIGH SCHOOL SITE (Continued) **S107736720**

Status Date:	05/22/2006
Restricted Use:	NO
Site Mgmt. Req.:	NONE SPECIFIED
Funding:	EPA Grant
Latitude:	36.7475
Longitude:	-120.3812
APN:	019-06-103
Past Use:	AGRICULTURAL - ROW CROPS
Potential COC:	30181, 30440
Confirmed COC:	NONE SPECIFIED
Potential Description:	IA, SOIL, SV
Alias Name:	019-06-103
Alias Type:	APN
Alias Name:	104514
Alias Type:	Project Code (Site Code)
Alias Name:	70000122
Alias Type:	Envirostor ID Number
Alias Name:	70000137
Alias Type:	Envirostor ID Number

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Preliminary Endangerment Assessment Workplan
Completed Date:	2006-02-24 00:00:00
Comments:	Not reported
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Preliminary Endangerment Assessment Report
Completed Date:	2006-05-22 00:00:00
Comments:	Approval of final PEA report.
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Cost Recovery Closeout Memo
Completed Date:	2006-12-07 00:00:00
Comments:	Not reported
Future Area Name:	Not reported
Future Sub Area Name:	Not reported
Future Document Type:	Not reported
Future Due Date:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported
Schedule Revised Date:	Not reported

Count: 40 records

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
FIREBAUGH	S106953228	CIRCLE G FARMS	I 5 & CALIFORNIA	93622	CUPA Listings
FIREBAUGH	S111212236	EXCAVATION OF SAN JOAQUIN	8TH ST	93622	ENF
FIREBAUGH	U001588158	RAMON ECHEVESTE	1888 8TH ST	93622	HIST UST
FIREBAUGH	S104868555	ECHEVESTE PROPERTY	1888 8TH	93622	CUPA Listings
FIREBAUGH	S106091369	PARAMOUNT FARMING COMPANY	AVE 71 & 2ND	93622	CUPA Listings, HAZNET
FIREBAUGH	S110816237	COLUMBIA CANAL COMPANY	AVE 71 & 2ND	93622	CUPA Listings
FIREBAUGH	S105023760	NEW COLUMBIA RANCH	AVE 71 & 2ND	93622	HIST CORTESE, LUST
FIREBAUGH	S106952945	TRI FARMS/JESS TELLERS	W BELMONT & WASHOE NW CORN	93622	CUPA Listings
FIREBAUGH	S106924720	CLIFF'S EXXON	1307 N HIGHWAY 33	93622	SWEEPS UST
FIREBAUGH	S103650124	SAN LUIS WATER DISTRICT	29315 POLELINE RD	93622	HAZNET
FIREBAUGH	S106926555	GARY & JESS ALLEN GRAIN HARVES	9502 ROAD 5 1-2	93622	SWEEPS UST
FIREBAUGH	S106931161	RAY BALDRIDGE	6353 ROAD 8 1-2	93622	SWEEPS UST
FIREBAUGH	S109457151	SAN JOAQUIN VILLAS	N ST CLYDE FANNON AVE NW	93622	NPDES
KERMAN	S107140968	SAN JOAQUIN VALLEY RAILROAD	APN 023	93630	HAZNET
KERMAN	S109693648	S GOLDENROD AVE ST PROJECT	S GOLDENROD AVENUE OF KEARNEY BLVD N	93630	NPDES
KERMAN	S106927210	HELM BEAN AND SEED	1100 S HWY 145	93630	SWEEPS UST
KERMAN	1003878610	TEXACO INC RAISIN CITY FLD KERMAN	8 MI SO OF	93630	CERC-NFRAP
KERMAN	S106353080	AT&T MOBILITY-SAN JOAQUIN 27316	3449 S STATE	93630	CUPA Listings
MENDOTA	S106922365	ABANDONED READY MIX PLANT	HWY 180	93640	SWEEPS UST
MENDOTA	S106175826	MENDOTA UNIFIED SCHOOL DIST	6TH & WHITESBRIDGE	93640	CUPA Listings
MENDOTA	S106929325	MENDOTA UNION SCHOOL DISTRICT	6TH / WHITBRIDGE RD	93640	SWEEPS UST
MENDOTA	S104870381	SOUTHERN PACIFIC TRANS CO	9TH & RR TRACK	93640	CUPA Listings
MENDOTA	8714861	1/2 S ADAMS AVE & SAN DIEGO AVE	1/2 S ADAMS AVE & SAN DIEGO AVE		ERNS
MENDOTA	S104867298	MENDOTA SOLID WASTE DISPOSAL	BASS	93640	CUPA Listings
MENDOTA	S107257300	MENDOTA TRANSFER STATION	BASS	93640	CUPA Listings
MENDOTA	S106924969	COUNTY OF FRESNO	BASS PARK MENDOTA	93640	SWEEPS UST
MENDOTA	U001589630	SILVER CREEK PACKING CO. SHOP	2158 BASS AVE.	93640	HIST CORTESE, LUST, HIST UST
MENDOTA	S106176374	SILVER CREEK PACKING	2158 BASS AVE	93640	LUST, CUPA Listings
MENDOTA	S100925074	SUMNER PECK RANCH	P.O. BOX 507	93640	Toxic Pits
MENDOTA	S111212868	MENDOTA COIT COTTON RECLAMATION PROJECT	37480 JENSEN	93640	ENF
MENDOTA	S104869947	MCI WORLDCOM-MENDOTA SITE 682	W KAMM & SAN DIEGO N OF	93640	CUPA Listings
MENDOTA	S108277090	VERIZON WIRELESS - WEST KAMM	W KAMM & I 5	93640	CUPA Listings
MENDOTA	S109431296	SAN LUIS & DELTA MENDOTA WATER AUTHORITY	LAT 3676460N LONG 12036868W	93640	HAZNET
MENDOTA	S108536878	JJ AUTO REPAIR	485 W NAPLES	93640	CUPA Listings
MENDOTA	1003877975	MENDOTA SITE	1 MI NE HWY 33	93640	CERC-NFRAP
MENDOTA	1010313866	MENDOTA DISPOSAL SITE	OFF BASS AVE	93640	RCRA-LQG
MENDOTA	S104870859	SAN MATEO RANCH	643 N SAN MATEO	93640	CUPA Listings
MENDOTA	S109148563	WESTERN SUN PRODUCTS	1455 N SAN MATEO RD	93640	CUPA Listings
MENDOTA	S109457946	SEWER INTERCEPTOR PROJECT	STHY 33 BASS AVE	93640	NPDES
MENDOTA	S101480055	SPRECKELS SUGAR COMPANY, INC.	WHITEBRIDGE RD & SAN MATEO	93640	ENVIROSTOR

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

FEDERAL RECORDS

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 06/30/2011
Date Data Arrived at EDR: 07/12/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 79

Source: EPA
Telephone: N/A
Last EDR Contact: 10/12/2011
Next Scheduled EDR Contact: 01/23/2012
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 06/30/2011
Date Data Arrived at EDR: 07/12/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 79

Source: EPA
Telephone: N/A
Last EDR Contact: 10/12/2011
Next Scheduled EDR Contact: 01/23/2012
Data Release Frequency: Quarterly

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 06/30/2011
Date Data Arrived at EDR: 07/12/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 79

Source: EPA
Telephone: N/A
Last EDR Contact: 10/12/2011
Next Scheduled EDR Contact: 01/23/2012
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 09/01/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Quarterly

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 09/01/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Quarterly

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 09/09/2011
Date Data Arrived at EDR: 09/16/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 08/12/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/09/2011
Date Data Arrived at EDR: 03/15/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 91

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Quarterly

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 10/05/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Quarterly

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 10/05/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 10/05/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 10/05/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Varies

RCRA-NonGen: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 10/05/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 03/16/2011
Date Data Arrived at EDR: 03/25/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 81

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 03/16/2011
Date Data Arrived at EDR: 03/25/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 81

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Varies

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 07/05/2011
Date Data Arrived at EDR: 07/05/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 86

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 10/04/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Annually

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 07/05/2011
Date Data Arrived at EDR: 07/05/2011
Date Made Active in Reports: 09/30/2011
Number of Days to Update: 87

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 10/04/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Annually

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/12/2011
Date Data Arrived at EDR: 02/11/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 80

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 08/09/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Varies

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 06/08/2011
Date Data Arrived at EDR: 09/16/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 13

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 09/07/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: Quarterly

US BROWNFIELDS: A Listing of Brownfields Sites

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 06/27/2011
Date Data Arrived at EDR: 06/27/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 09/28/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: Semi-Annually

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 10/20/2011
Next Scheduled EDR Contact: 01/30/2012
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 08/12/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 112

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 07/11/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 06/01/2011
Date Data Arrived at EDR: 08/19/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 41

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 10/03/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 07/31/2011
Date Data Arrived at EDR: 09/14/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 15

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 09/14/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/21/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 99

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 08/31/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Varies

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/18/2011
Date Data Arrived at EDR: 09/08/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 21

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 09/08/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/17/2010
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 94

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 09/01/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 09/27/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/31/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/31/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 08/18/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/07/2011
Date Data Arrived at EDR: 01/21/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 59

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/10/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 98

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 10/19/2011
Next Scheduled EDR Contact: 01/30/2012
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 06/21/2011
Date Data Arrived at EDR: 07/15/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 60

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/11/2011
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 10/13/2011
Next Scheduled EDR Contact: 01/23/2012
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/14/2010
Date Data Arrived at EDR: 04/16/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 41

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 09/13/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 09/01/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Biennially

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPAa??s Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 12/10/2010
Date Data Arrived at EDR: 01/11/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 36

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 10/14/2011
Next Scheduled EDR Contact: 01/23/2012
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 01/01/2008
Date Data Arrived at EDR: 02/18/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 100
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 10/19/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

COAL ASH DOE: Sleam-Electric Plan Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 10/18/2011
Next Scheduled EDR Contact: 01/30/2012
Data Release Frequency: Varies

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55
Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 10/17/2011
Next Scheduled EDR Contact: 01/30/2012
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010
Date Data Arrived at EDR: 01/03/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 77
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 09/16/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Varies

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing
The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54
Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 10/24/2011
Next Scheduled EDR Contact: 02/06/2012
Data Release Frequency: Varies

STATE AND LOCAL RECORDS

HIST CAL-SITES: Calsites Database
The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

Date of Government Version: 08/08/2005
Date Data Arrived at EDR: 08/03/2006
Date Made Active in Reports: 08/24/2006
Number of Days to Update: 21
Source: Department of Toxic Substance Control
Telephone: 916-323-3400
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CA BOND EXP. PLAN: Bond Expenditure Plan

Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/1989
Date Data Arrived at EDR: 07/27/1994
Date Made Active in Reports: 08/02/1994
Number of Days to Update: 6

Source: Department of Health Services
Telephone: 916-255-2118
Last EDR Contact: 05/31/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SCH: School Property Evaluation Program

This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category depending on the level of threat to public health and safety or the environment they pose.

Date of Government Version: 09/13/2011
Date Data Arrived at EDR: 09/15/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 39

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 09/15/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Quarterly

TOXIC PITS: Toxic Pits Cleanup Act Sites

Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/1995
Date Data Arrived at EDR: 08/30/1995
Date Made Active in Reports: 09/26/1995
Number of Days to Update: 27

Source: State Water Resources Control Board
Telephone: 916-227-4364
Last EDR Contact: 01/26/2009
Next Scheduled EDR Contact: 04/27/2009
Data Release Frequency: No Update Planned

SWF/LF (SWIS): Solid Waste Information System

Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 08/22/2011
Date Data Arrived at EDR: 08/24/2011
Date Made Active in Reports: 10/03/2011
Number of Days to Update: 40

Source: Department of Resources Recycling and Recovery
Telephone: 916-341-6320
Last EDR Contact: 08/24/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Quarterly

WMUDS/SWAT: Waste Management Unit Database

Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 04/10/2000
Date Made Active in Reports: 05/10/2000
Number of Days to Update: 30

Source: State Water Resources Control Board
Telephone: 916-227-4448
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

NPDES: NPDES Permits Listing

A listing of NPDES permits, including stormwater.

Date of Government Version: 08/23/2011
Date Data Arrived at EDR: 08/24/2011
Date Made Active in Reports: 10/03/2011
Number of Days to Update: 40

Source: State Water Resources Control Board
Telephone: 916-445-9379
Last EDR Contact: 08/24/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Quarterly

WDS: Waste Discharge System

Sites which have been issued waste discharge requirements.

Date of Government Version: 06/19/2007
Date Data Arrived at EDR: 06/20/2007
Date Made Active in Reports: 06/29/2007
Number of Days to Update: 9

Source: State Water Resources Control Board
Telephone: 916-341-5227
Last EDR Contact: 08/31/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Quarterly

CORTESE: "Cortese" Hazardous Waste & Substances Sites List

The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites). This listing is no longer updated by the state agency.

Date of Government Version: 10/03/2011
Date Data Arrived at EDR: 10/04/2011
Date Made Active in Reports: 10/25/2011
Number of Days to Update: 21

Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-3400
Last EDR Contact: 10/04/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Quarterly

HIST CORTESE: Hazardous Waste & Substance Site List

The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES].

Date of Government Version: 04/01/2001
Date Data Arrived at EDR: 01/22/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/22/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SWRCY: Recycler Database

A listing of recycling facilities in California.

Date of Government Version: 09/08/2011
Date Data Arrived at EDR: 09/20/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 34

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 09/20/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

LUST: Geotracker's Leaking Underground Fuel Tank Report

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state. For more information on a particular leaking underground storage tank sites, please contact the appropriate regulatory agency.

Date of Government Version: 09/19/2011
Date Data Arrived at EDR: 09/20/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 34

Source: State Water Resources Control Board
Telephone: see region list
Last EDR Contact: 09/20/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

LUST REG 1: Active Toxic Site Investigation

Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 02/28/2001
Date Made Active in Reports: 03/29/2001
Number of Days to Update: 29

Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-570-3769
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 2: Fuel Leak List

Leaking Underground Storage Tank locations. Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma counties.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-622-2433
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

LUST REG 3: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz counties.

Date of Government Version: 05/19/2003
Date Data Arrived at EDR: 05/19/2003
Date Made Active in Reports: 06/02/2003
Number of Days to Update: 14

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-542-4786
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

LUST REG 9: Leaking Underground Storage Tank Report

Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/2001
Date Data Arrived at EDR: 04/23/2001
Date Made Active in Reports: 05/21/2001
Number of Days to Update: 28

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-637-5595
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

LUST REG 5: Leaking Underground Storage Tank Database

Leaking Underground Storage Tank locations. Alameda, Alpine, Amador, Butte, Colusa, Contra Costa, Calveras, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba counties.

Date of Government Version: 07/01/2008
Date Data Arrived at EDR: 07/22/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 9

Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-4834
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Quarterly

LUST REG 6L: Leaking Underground Storage Tank Case Listing

For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/09/2003
Date Data Arrived at EDR: 09/10/2003
Date Made Active in Reports: 10/07/2003
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 530-542-5572
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 6V: Leaking Underground Storage Tank Case Listing

Leaking Underground Storage Tank locations. Inyo, Kern, Los Angeles, Mono, San Bernardino counties.

Date of Government Version: 06/07/2005
Date Data Arrived at EDR: 06/07/2005
Date Made Active in Reports: 06/29/2005
Number of Days to Update: 22

Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-241-7365
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 7: Leaking Underground Storage Tank Case Listing
Leaking Underground Storage Tank locations. Imperial, Riverside, San Diego, Santa Barbara counties.

Date of Government Version: 02/26/2004
Date Data Arrived at EDR: 02/26/2004
Date Made Active in Reports: 03/24/2004
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-776-8943
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 8: Leaking Underground Storage Tanks
California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/14/2005
Date Data Arrived at EDR: 02/15/2005
Date Made Active in Reports: 03/28/2005
Number of Days to Update: 41

Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4496
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Varies

LUST REG 4: Underground Storage Tank Leak List
Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6710
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

CA FID UST: Facility Inventory Database
The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/1994
Date Data Arrived at EDR: 09/05/1995
Date Made Active in Reports: 09/29/1995
Number of Days to Update: 24

Source: California Environmental Protection Agency
Telephone: 916-341-5851
Last EDR Contact: 12/28/1998
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SLIC: Statewide SLIC Cases
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/19/2011
Date Data Arrived at EDR: 09/20/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 34

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/20/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Varies

SLIC REG 1: Active Toxic Site Investigations
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2003
Date Data Arrived at EDR: 04/07/2003
Date Made Active in Reports: 04/25/2003
Number of Days to Update: 18

Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/18/2006
Date Data Arrived at EDR: 05/18/2006
Date Made Active in Reports: 06/15/2006
Number of Days to Update: 28

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: Semi-Annually

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/17/2004
Date Data Arrived at EDR: 11/18/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 47

Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/01/2005
Date Data Arrived at EDR: 04/05/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 16

Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-3291
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/24/2005
Date Data Arrived at EDR: 05/25/2005
Date Made Active in Reports: 06/16/2005
Number of Days to Update: 22

Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Semi-Annually

SLIC REG 6L: SLIC Sites
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board, Lahontan Region
Telephone: 530-542-5574
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

SLIC REG 7: SLIC List
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/24/2004
Date Data Arrived at EDR: 11/29/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 36
Source: California Regional Quality Control Board, Colorado River Basin Region
Telephone: 760-346-7491
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2008
Date Data Arrived at EDR: 04/03/2008
Date Made Active in Reports: 04/14/2008
Number of Days to Update: 11
Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 951-782-3298
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/10/2007
Date Data Arrived at EDR: 09/11/2007
Date Made Active in Reports: 09/28/2007
Number of Days to Update: 17
Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Annually

UST: Active UST Facilities
Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 09/19/2011
Date Data Arrived at EDR: 09/20/2011
Date Made Active in Reports: 10/19/2011
Number of Days to Update: 29
Source: SWRCB
Telephone: 916-480-1028
Last EDR Contact: 09/20/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Semi-Annually

UST MENDOCINO: Mendocino County UST Database
A listing of underground storage tank locations in Mendocino County.

Date of Government Version: 09/23/2009
Date Data Arrived at EDR: 09/23/2009
Date Made Active in Reports: 10/01/2009
Number of Days to Update: 8
Source: Department of Public Health
Telephone: 707-463-4466
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: Annually

HIST UST: Hazardous Substance Storage Container Database
The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/1990
Date Data Arrived at EDR: 01/25/1991
Date Made Active in Reports: 02/12/1991
Number of Days to Update: 18
Source: State Water Resources Control Board
Telephone: 916-341-5851
Last EDR Contact: 07/26/2001
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

LIENS: Environmental Liens Listing
A listing of property locations with environmental liens for California where DTSC is a lien holder.

Date of Government Version: 09/19/2011
Date Data Arrived at EDR: 09/20/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 34

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Varies

SWEEPS UST: SWEEPS UST Listing

Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

Date of Government Version: 06/01/1994
Date Data Arrived at EDR: 07/07/2005
Date Made Active in Reports: 08/11/2005
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/03/2005
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CHMIRS: California Hazardous Material Incident Report System

California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 05/03/2011
Date Made Active in Reports: 06/15/2011
Number of Days to Update: 43

Source: Office of Emergency Services
Telephone: 916-845-8400
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

LDS: Land Disposal Sites Listing

The Land Disposal program regulates of waste discharge to land for treatment, storage and disposal in waste management units.

Date of Government Version: 09/19/2011
Date Data Arrived at EDR: 09/20/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 34

Source: State Water Qualilty Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/20/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

MCS: Military Cleanup Sites Listing

The State Water Resources Control Board and nine Regional Water Quality Control Boards partner with the Department of Defense (DoD) through the Defense and State Memorandum of Agreement (DSMOA) to oversee the investigation and remediation of water quality issues at military facilities.

Date of Government Version: 09/19/2011
Date Data Arrived at EDR: 09/20/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 34

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 09/20/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

AST: Aboveground Petroleum Storage Tank Facilities

Registered Aboveground Storage Tanks.

Date of Government Version: 08/01/2009
Date Data Arrived at EDR: 09/10/2009
Date Made Active in Reports: 10/01/2009
Number of Days to Update: 21

Source: State Water Resources Control Board
Telephone: 916-341-5712
Last EDR Contact: 10/11/2011
Next Scheduled EDR Contact: 01/23/2012
Data Release Frequency: Quarterly

NOTIFY 65: Proposition 65 Records

Listings of all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agency.

Date of Government Version: 10/21/1993
Date Data Arrived at EDR: 11/01/1993
Date Made Active in Reports: 11/19/1993
Number of Days to Update: 18

Source: State Water Resources Control Board
Telephone: 916-445-3846
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

DEED: Deed Restriction Listing

Site Mitigation and Brownfields Reuse Program Facility Sites with Deed Restrictions & Hazardous Waste Management Program Facility Sites with Deed / Land Use Restriction. The DTSC Site Mitigation and Brownfields Reuse Program (SMBRP) list includes sites cleaned up under the program's oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active. Some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

Date of Government Version: 09/12/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 24

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 09/13/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

VCP: Voluntary Cleanup Program Properties

Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 09/13/2011
Date Data Arrived at EDR: 09/15/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 39

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 09/15/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Quarterly

DRYCLEANERS: Cleaner Facilities

A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner's agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

Date of Government Version: 06/28/2011
Date Data Arrived at EDR: 07/21/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 21

Source: Department of Toxic Substance Control
Telephone: 916-327-4498
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Annually

WIP: Well Investigation Program Case List

Well Investigation Program case in the San Gabriel and San Fernando Valley area.

Date of Government Version: 07/03/2009
Date Data Arrived at EDR: 07/21/2009
Date Made Active in Reports: 08/03/2009
Number of Days to Update: 13

Source: Los Angeles Water Quality Control Board
Telephone: 213-576-6726
Last EDR Contact: 10/03/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Varies

ENF: Enforcement Action Listing

A listing of Water Board Enforcement Actions. Formal is everything except Oral/Verbal Communication, Notice of Violation, Expedited Payment Letter, and Staff Enforcement Letter.

Date of Government Version: 08/15/2011
Date Data Arrived at EDR: 08/23/2011
Date Made Active in Reports: 10/03/2011
Number of Days to Update: 41

Source: State Water Resoruces Control Board
Telephone: 916-445-9379
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

CDL: Clandestine Drug Labs

A listing of drug lab locations. Listing of a location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the location either requires or does not require additional cleanup work.

Date of Government Version: 06/30/2011
Date Data Arrived at EDR: 08/11/2011
Date Made Active in Reports: 09/09/2011
Number of Days to Update: 29

Source: Department of Toxic Substances Control
Telephone: 916-255-6504
Last EDR Contact: 10/03/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Varies

RESPONSE: State Response Sites

Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

Date of Government Version: 09/13/2011
Date Data Arrived at EDR: 09/15/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 39

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 09/15/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Quarterly

HAZNET: Facility and Manifest Data

Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 07/19/2011
Date Made Active in Reports: 08/16/2011
Number of Days to Update: 28

Source: California Environmental Protection Agency
Telephone: 916-255-1136
Last EDR Contact: 10/17/2011
Next Scheduled EDR Contact: 01/30/2012
Data Release Frequency: Annually

EMI: Emissions Inventory Data

Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 10/18/2010
Number of Days to Update: 19

Source: California Air Resources Board
Telephone: 916-322-2990
Last EDR Contact: 09/30/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: Varies

ENVIROSTOR: EnviroStor Database

The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

Date of Government Version: 09/13/2011
Date Data Arrived at EDR: 09/15/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 39

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 09/15/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Quarterly

HAULERS: Registered Waste Tire Haulers Listing
A listing of registered waste tire haulers.

Date of Government Version: 09/14/2011
Date Data Arrived at EDR: 09/15/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 39

Source: Integrated Waste Management Board
Telephone: 916-341-6422
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Varies

HWP: EnviroStor Permitted Facilities Listing
Detailed information on permitted hazardous waste facilities and corrective action ("cleanups") tracked in EnviroStor.

Date of Government Version: 08/09/2010
Date Data Arrived at EDR: 08/11/2010
Date Made Active in Reports: 08/20/2010
Number of Days to Update: 9

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 09/01/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Quarterly

HWT: Registered Hazardous Waste Transporter Database
A listing of hazardous waste transporters. In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes unless the person holds a valid registration issued by DTSC. A hazardous waste transporter registration is valid for one year and is assigned a unique registration number.

Date of Government Version: 07/18/2011
Date Data Arrived at EDR: 07/19/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 23

Source: Department of Toxic Substances Control
Telephone: 916-440-7145
Last EDR Contact: 10/21/2011
Next Scheduled EDR Contact: 01/30/2012
Data Release Frequency: Quarterly

MWMP: Medical Waste Management Program Listing
The Medical Waste Management Program (MWMP) ensures the proper handling and disposal of medical waste by permitting and inspecting medical waste Offsite Treatment Facilities (PDF) and Transfer Stations (PDF) throughout the state. MWMP also oversees all Medical Waste Transporters.

Date of Government Version: 09/09/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 10/10/2011
Number of Days to Update: 27

Source: Department of Public Health
Telephone: 916-558-1784
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Varies

PROC: Certified Processors Database
A listing of certified processors.

Date of Government Version: 09/08/2011
Date Data Arrived at EDR: 09/20/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 34

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 09/20/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

TRIBAL RECORDS

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 10/20/2011
Next Scheduled EDR Contact: 01/30/2012
Data Release Frequency: Semi-Annually

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 05/05/2011
Date Data Arrived at EDR: 08/02/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 42

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 08/02/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/31/2011
Date Data Arrived at EDR: 02/01/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 48

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Quarterly

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 08/04/2011
Date Data Arrived at EDR: 08/05/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 39

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Quarterly

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 08/18/2011
Date Data Arrived at EDR: 08/19/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 25

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 02/16/2011
Date Data Arrived at EDR: 06/02/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 103

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 08/02/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 34

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 08/11/2011
Date Data Arrived at EDR: 08/12/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 32

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Semi-Annually

INDIAN UST R1: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 05/05/2011
Date Data Arrived at EDR: 08/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 36

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 08/02/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 34

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/01/2011
Date Data Arrived at EDR: 06/01/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 13

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 08/02/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 08/18/2011
Date Data Arrived at EDR: 08/19/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 25

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 08/04/2011
Date Data Arrived at EDR: 08/05/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 39

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Quarterly

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 08/11/2011
Date Data Arrived at EDR: 08/12/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 32

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 07/01/2011
Date Data Arrived at EDR: 08/26/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 18

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 08/04/2011
Date Data Arrived at EDR: 08/05/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 39

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Quarterly

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 05/05/2011
Date Data Arrived at EDR: 07/05/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 70

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 10/04/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR PROPRIETARY RECORDS

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

COUNTY RECORDS

ALAMEDA COUNTY:

Contaminated Sites

A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

Date of Government Version: 07/21/2011
Date Data Arrived at EDR: 07/21/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 21

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 10/03/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Semi-Annually

Underground Tanks

Underground storage tank sites located in Alameda county.

Date of Government Version: 07/21/2011
Date Data Arrived at EDR: 07/21/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 21

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 10/03/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Semi-Annually

BUTTE COUNTY:

CUPA Facility Listing

Cupa facility list.

Date of Government Version: 03/29/2011
Date Data Arrived at EDR: 04/20/2011
Date Made Active in Reports: 05/17/2011
Number of Days to Update: 27

Source: Public Health Department
Telephone: 530-538-7149
Last EDR Contact: 10/17/2011
Next Scheduled EDR Contact: 01/30/2012
Data Release Frequency: Varies

COLUSA COUNTY:

CUPA Facility List

Cupa facility list.

Date of Government Version: 12/01/2010
Date Data Arrived at EDR: 04/20/2011
Date Made Active in Reports: 05/17/2011
Number of Days to Update: 27

Source: Health & Human Services
Telephone: 530-458-0396
Last EDR Contact: 10/17/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: Varies

CONTRA COSTA COUNTY:

Site List
List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 08/30/2011
Date Data Arrived at EDR: 08/31/2011
Date Made Active in Reports: 09/19/2011
Number of Days to Update: 19

Source: Contra Costa Health Services Department
Telephone: 925-646-2286
Last EDR Contact: 08/09/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Semi-Annually

EL DORADO COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 09/09/2011
Date Data Arrived at EDR: 09/09/2011
Date Made Active in Reports: 10/03/2011
Number of Days to Update: 24

Source: El Dorado County Environmental Management Department
Telephone: 530-621-6623
Last EDR Contact: 08/22/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Varies

FRESNO COUNTY:

CUPA Resources List
Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 07/18/2011
Date Data Arrived at EDR: 07/19/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 23

Source: Dept. of Community Health
Telephone: 559-445-3271
Last EDR Contact: 10/17/2011
Next Scheduled EDR Contact: 01/30/2012
Data Release Frequency: Semi-Annually

HUMBOLDT COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 02/08/2011
Date Data Arrived at EDR: 03/03/2011
Date Made Active in Reports: 03/24/2011
Number of Days to Update: 21

Source: Humboldt County Environmental Health
Telephone: N/A
Last EDR Contact: 10/27/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Varies

INYO COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 09/12/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 10/03/2011
Number of Days to Update: 20

Source: Inyo County Environmental Health Services
Telephone: 760-878-0238
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Varies

KERN COUNTY:

Underground Storage Tank Sites & Tank Listing
Kern County Sites and Tanks Listing.

Date of Government Version: 08/31/2010
Date Data Arrived at EDR: 09/01/2010
Date Made Active in Reports: 09/30/2010
Number of Days to Update: 29

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Last EDR Contact: 09/13/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Quarterly

KINGS COUNTY:

CUPA Facility List
A listing of sites included in the county?s Certified Unified Program Agency database. California?s Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 06/09/2011
Date Data Arrived at EDR: 06/09/2011
Date Made Active in Reports: 07/08/2011
Number of Days to Update: 29

Source: Kings County Department of Public Health
Telephone: 559-584-1411
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Varies

LOS ANGELES COUNTY:

San Gabriel Valley Areas of Concern
San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office.

Date of Government Version: 03/30/2009
Date Data Arrived at EDR: 03/31/2009
Date Made Active in Reports: 10/23/2009
Number of Days to Update: 206

Source: EPA Region 9
Telephone: 415-972-3178
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

HMS: Street Number List
Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 07/28/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 24

Source: Department of Public Works
Telephone: 626-458-3517
Last EDR Contact: 10/17/2011
Next Scheduled EDR Contact: 01/30/2012
Data Release Frequency: Semi-Annually

List of Solid Waste Facilities
Solid Waste Facilities in Los Angeles County.

Date of Government Version: 07/25/2011
Date Data Arrived at EDR: 07/27/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 15

Source: La County Department of Public Works
Telephone: 818-458-5185
Last EDR Contact: 10/25/2011
Next Scheduled EDR Contact: 11/07/2011
Data Release Frequency: Varies

City of Los Angeles Landfills

Landfills owned and maintained by the City of Los Angeles.

Date of Government Version: 03/05/2009
Date Data Arrived at EDR: 03/10/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 29

Source: Engineering & Construction Division
Telephone: 213-473-7869
Last EDR Contact: 08/23/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Varies

Site Mitigation List

Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 02/09/2011
Date Data Arrived at EDR: 02/09/2011
Date Made Active in Reports: 03/04/2011
Number of Days to Update: 23

Source: Community Health Services
Telephone: 323-890-7806
Last EDR Contact: 10/24/2011
Next Scheduled EDR Contact: 02/06/2012
Data Release Frequency: Annually

City of El Segundo Underground Storage Tank

Underground storage tank sites located in El Segundo city.

Date of Government Version: 02/03/2011
Date Data Arrived at EDR: 02/08/2011
Date Made Active in Reports: 03/03/2011
Number of Days to Update: 23

Source: City of El Segundo Fire Department
Telephone: 310-524-2236
Last EDR Contact: 10/24/2011
Next Scheduled EDR Contact: 02/06/2012
Data Release Frequency: Semi-Annually

City of Long Beach Underground Storage Tank

Underground storage tank sites located in the city of Long Beach.

Date of Government Version: 03/28/2003
Date Data Arrived at EDR: 10/23/2003
Date Made Active in Reports: 11/26/2003
Number of Days to Update: 34

Source: City of Long Beach Fire Department
Telephone: 562-570-2563
Last EDR Contact: 05/02/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Annually

City of Torrance Underground Storage Tank

Underground storage tank sites located in the city of Torrance.

Date of Government Version: 07/18/2011
Date Data Arrived at EDR: 07/21/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 21

Source: City of Torrance Fire Department
Telephone: 310-618-2973
Last EDR Contact: 10/17/2011
Next Scheduled EDR Contact: 01/30/2012
Data Release Frequency: Semi-Annually

MADERA COUNTY:

CUPA Facility List

A listing of sites included in the county?s Certified Unified Program Agency database. California?s Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 09/13/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 10/04/2011
Number of Days to Update: 21

Source: Madera County Environmental Health
Telephone: 559-675-7823
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Varies

MARIN COUNTY:

Underground Storage Tank Sites
Currently permitted USTs in Marin County.

Date of Government Version: 07/15/2011
Date Data Arrived at EDR: 07/25/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 17

Source: Public Works Department Waste Management
Telephone: 415-499-6647
Last EDR Contact: 10/11/2011
Next Scheduled EDR Contact: 01/23/2012
Data Release Frequency: Semi-Annually

MERCED COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 09/23/2011
Date Data Arrived at EDR: 09/23/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 31

Source: Merced County Environmental Health
Telephone: 209-381-1094
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Varies

MONTEREY COUNTY:

CUPA Facility Listing
CUPA Program listing from the Environmental Health Division.

Date of Government Version: 09/19/2011
Date Data Arrived at EDR: 09/20/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 34

Source: Monterey County Health Department
Telephone: 831-796-1297
Last EDR Contact: 08/31/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Varies

NAPA COUNTY:

Sites With Reported Contamination
A listing of leaking underground storage tank sites located in Napa county.

Date of Government Version: 07/09/2008
Date Data Arrived at EDR: 07/09/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 22

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

Closed and Operating Underground Storage Tank Sites
Underground storage tank sites located in Napa county.

Date of Government Version: 01/15/2008
Date Data Arrived at EDR: 01/16/2008
Date Made Active in Reports: 02/08/2008
Number of Days to Update: 23

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

NEVADA COUNTY:

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

CUPA Facility List
CUPA facility list.

Date of Government Version: 08/22/2011
Date Data Arrived at EDR: 08/23/2011
Date Made Active in Reports: 09/19/2011
Number of Days to Update: 27

Source: Community Development Agency
Telephone: 530-265-1467
Last EDR Contact: 08/22/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Varies

ORANGE COUNTY:

List of Industrial Site Cleanups
Petroleum and non-petroleum spills.

Date of Government Version: 08/01/2011
Date Data Arrived at EDR: 08/23/2011
Date Made Active in Reports: 09/19/2011
Number of Days to Update: 27

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 08/17/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Annually

List of Underground Storage Tank Cleanups
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 08/02/2011
Date Data Arrived at EDR: 08/23/2011
Date Made Active in Reports: 10/03/2011
Number of Days to Update: 41

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 08/17/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Quarterly

List of Underground Storage Tank Facilities
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 08/01/2011
Date Data Arrived at EDR: 08/23/2011
Date Made Active in Reports: 09/16/2011
Number of Days to Update: 24

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 08/17/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Quarterly

PLACER COUNTY:

Master List of Facilities
List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 09/12/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 10/18/2011
Number of Days to Update: 35

Source: Placer County Health and Human Services
Telephone: 530-889-7312
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

RIVERSIDE COUNTY:

Listing of Underground Tank Cleanup Sites
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 07/14/2011
Date Data Arrived at EDR: 07/22/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 20

Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: Quarterly

Underground Storage Tank Tank List
Underground storage tank sites located in Riverside county.

Date of Government Version: 07/20/2011
Date Data Arrived at EDR: 07/22/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 20
Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/26/2012
Data Release Frequency: Quarterly

SACRAMENTO COUNTY:

Toxic Site Clean-Up List
List of sites where unauthorized releases of potentially hazardous materials have occurred.

Date of Government Version: 05/02/2011
Date Data Arrived at EDR: 07/19/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 23
Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 10/07/2011
Next Scheduled EDR Contact: 01/23/2012
Data Release Frequency: Quarterly

Master Hazardous Materials Facility List
Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 05/02/2011
Date Data Arrived at EDR: 07/19/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 23
Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 10/07/2011
Next Scheduled EDR Contact: 01/23/2012
Data Release Frequency: Quarterly

SAN BERNARDINO COUNTY:

Hazardous Material Permits
This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 08/26/2011
Date Data Arrived at EDR: 08/31/2011
Date Made Active in Reports: 09/19/2011
Number of Days to Update: 19
Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Quarterly

SAN DIEGO COUNTY:

Hazardous Materials Management Division Database
The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 09/09/2010
Date Data Arrived at EDR: 09/15/2010
Date Made Active in Reports: 09/29/2010
Number of Days to Update: 14
Source: Hazardous Materials Management Division
Telephone: 619-338-2268
Last EDR Contact: 09/16/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Quarterly

Solid Waste Facilities
San Diego County Solid Waste Facilities.

Date of Government Version: 10/01/2010
Date Data Arrived at EDR: 11/16/2010
Date Made Active in Reports: 01/25/2011
Number of Days to Update: 70

Source: Department of Health Services
Telephone: 619-338-2209
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

Environmental Case Listing
The listing contains all underground tank release cases and projects pertaining to properties contaminated with hazardous substances that are actively under review by the Site Assessment and Mitigation Program.

Date of Government Version: 03/23/2010
Date Data Arrived at EDR: 06/15/2010
Date Made Active in Reports: 07/09/2010
Number of Days to Update: 24

Source: San Diego County Department of Environmental Health
Telephone: 619-338-2371
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

SAN FRANCISCO COUNTY:

Local Oversite Facilities
A listing of leaking underground storage tank sites located in San Francisco county.

Date of Government Version: 09/19/2008
Date Data Arrived at EDR: 09/19/2008
Date Made Active in Reports: 09/29/2008
Number of Days to Update: 10

Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Quarterly

Underground Storage Tank Information
Underground storage tank sites located in San Francisco county.

Date of Government Version: 11/29/2010
Date Data Arrived at EDR: 03/10/2011
Date Made Active in Reports: 03/15/2011
Number of Days to Update: 5

Source: Department of Public Health
Telephone: 415-252-3920
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Quarterly

SAN JOAQUIN COUNTY:

San Joaquin Co. UST
A listing of underground storage tank locations in San Joaquin county.

Date of Government Version: 09/27/2011
Date Data Arrived at EDR: 09/28/2011
Date Made Active in Reports: 10/19/2011
Number of Days to Update: 21

Source: Environmental Health Department
Telephone: N/A
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: Semi-Annually

SAN LUIS OBISPO COUNTY:

CUPA Facility List
Cupa Facility List.

Date of Government Version: 09/12/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 24

Source: San Luis Obispo County Public Health Department
Telephone: 805-781-5596
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Varies

SAN MATEO COUNTY:

Business Inventory
List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 07/13/2011
Date Data Arrived at EDR: 07/15/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 27
Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/12/2012
Data Release Frequency: Annually

Fuel Leak List
A listing of leaking underground storage tank sites located in San Mateo county.

Date of Government Version: 09/20/2011
Date Data Arrived at EDR: 09/22/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 32
Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Semi-Annually

SANTA BARBARA COUNTY:

CUPA Facility Listing
CUPA Program Listing from the Environmental Health Services division.

Date of Government Version: 09/08/2011
Date Data Arrived at EDR: 09/09/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 28
Source: Santa Barbara County Public Health Department
Telephone: 805-686-8167
Last EDR Contact: 08/31/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Varies

SANTA CLARA COUNTY:

HIST LUST - Fuel Leak Site Activity Report
A listing of open and closed leaking underground storage tanks. This listing is no longer updated by the county. Leaking underground storage tanks are now handled by the Department of Environmental Health.

Date of Government Version: 03/29/2005
Date Data Arrived at EDR: 03/30/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 22
Source: Santa Clara Valley Water District
Telephone: 408-265-2600
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

LOP Listing
A listing of leaking underground storage tanks located in Santa Clara county.

Date of Government Version: 09/06/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 10/10/2011
Number of Days to Update: 27
Source: Department of Environmental Health
Telephone: 408-918-3417
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: Annually

Hazardous Material Facilities
Hazardous material facilities, including underground storage tank sites.

Date of Government Version: 09/01/2011
Date Data Arrived at EDR: 09/01/2011
Date Made Active in Reports: 10/03/2011
Number of Days to Update: 32
Source: City of San Jose Fire Department
Telephone: 408-535-7694
Last EDR Contact: 08/31/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Annually

SANTA CRUZ COUNTY:

CUPA Facility List
CUPA facility listing.

Date of Government Version: 08/31/2011
Date Data Arrived at EDR: 08/31/2011
Date Made Active in Reports: 09/09/2011
Number of Days to Update: 9

Source: Santa Cruz County Environmental Health
Telephone: 831-464-2761
Last EDR Contact: 08/31/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Varies

SHASTA COUNTY:

CUPA Facility List
Cupa Facility List.

Date of Government Version: 08/31/2011
Date Data Arrived at EDR: 08/31/2011
Date Made Active in Reports: 09/19/2011
Number of Days to Update: 19

Source: Shasta County Department of Resource Management
Telephone: 530-225-5789
Last EDR Contact: 08/31/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Varies

SOLANO COUNTY:

Leaking Underground Storage Tanks
A listing of leaking underground storage tank sites located in Solano county.

Date of Government Version: 09/20/2011
Date Data Arrived at EDR: 09/28/2011
Date Made Active in Reports: 10/25/2011
Number of Days to Update: 27

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

Underground Storage Tanks
Underground storage tank sites located in Solano county.

Date of Government Version: 09/20/2011
Date Data Arrived at EDR: 09/28/2011
Date Made Active in Reports: 10/19/2011
Number of Days to Update: 21

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

SONOMA COUNTY:

Leaking Underground Storage Tank Sites
A listing of leaking underground storage tank sites located in Sonoma county.

Date of Government Version: 04/05/2011
Date Data Arrived at EDR: 04/06/2011
Date Made Active in Reports: 05/12/2011
Number of Days to Update: 36

Source: Department of Health Services
Telephone: 707-565-6565
Last EDR Contact: 10/03/2011
Next Scheduled EDR Contact: 01/16/2012
Data Release Frequency: Quarterly

SUTTER COUNTY:

Underground Storage Tanks
Underground storage tank sites located in Sutter county.

Date of Government Version: 09/12/2011
Date Data Arrived at EDR: 09/13/2011
Date Made Active in Reports: 10/19/2011
Number of Days to Update: 36

Source: Sutter County Department of Agriculture
Telephone: 530-822-7500
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

VENTURA COUNTY:

Business Plan, Hazardous Waste Producers, and Operating Underground Tanks

The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 07/26/2011
Date Data Arrived at EDR: 08/26/2011
Date Made Active in Reports: 09/19/2011
Number of Days to Update: 24

Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 08/23/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Quarterly

Inventory of Illegal Abandoned and Inactive Sites

Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 09/14/2011
Date Data Arrived at EDR: 09/15/2011
Date Made Active in Reports: 10/24/2011
Number of Days to Update: 39

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 10/11/2011
Next Scheduled EDR Contact: 01/23/2012
Data Release Frequency: Annually

Listing of Underground Tank Cleanup Sites

Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/29/2008
Date Data Arrived at EDR: 06/24/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 37

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 08/23/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Quarterly

Medical Waste Program List

To protect public health and safety and the environment from potential exposure to disease causing agents, the Environmental Health Division Medical Waste Program regulates the generation, handling, storage, treatment and disposal of medical waste throughout the County.

Date of Government Version: 07/26/2011
Date Data Arrived at EDR: 08/08/2011
Date Made Active in Reports: 09/09/2011
Number of Days to Update: 32

Source: Ventura County Resource Management Agency
Telephone: 805-654-2813
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Quarterly

Underground Tank Closed Sites List

Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 08/30/2011
Date Data Arrived at EDR: 09/20/2011
Date Made Active in Reports: 10/19/2011
Number of Days to Update: 29

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 09/20/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

YOLO COUNTY:

Underground Storage Tank Comprehensive Facility Report
Underground storage tank sites located in Yolo county.

Date of Government Version: 08/15/2011
Date Data Arrived at EDR: 08/23/2011
Date Made Active in Reports: 09/16/2011
Number of Days to Update: 24

Source: Yolo County Department of Health
Telephone: 530-666-8646
Last EDR Contact: 10/11/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: Annually

YUBA COUNTY:

CUPA Facility List
CUPA facility listing for Yuba County.

Date of Government Version: 08/23/2011
Date Data Arrived at EDR: 08/26/2011
Date Made Active in Reports: 09/19/2011
Number of Days to Update: 24

Source: Yuba County Environmental Health Department
Telephone: 530-749-7523
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 08/26/2009
Date Made Active in Reports: 09/11/2009
Number of Days to Update: 16

Source: Department of Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 10/28/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Annually

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 07/20/2011
Date Made Active in Reports: 08/11/2011
Number of Days to Update: 22

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 10/18/2011
Next Scheduled EDR Contact: 01/30/2012
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 08/01/2011
Date Data Arrived at EDR: 08/09/2011
Date Made Active in Reports: 09/16/2011
Number of Days to Update: 38

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 08/09/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Annually

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 12/01/2009
Date Made Active in Reports: 12/14/2009
Number of Days to Update: 13

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 06/24/2011
Date Made Active in Reports: 06/30/2011
Number of Days to Update: 6

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 08/31/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 08/19/2011
Date Made Active in Reports: 09/15/2011
Number of Days to Update: 27

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 916-657-4041

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

STREET AND ADDRESS INFORMATION

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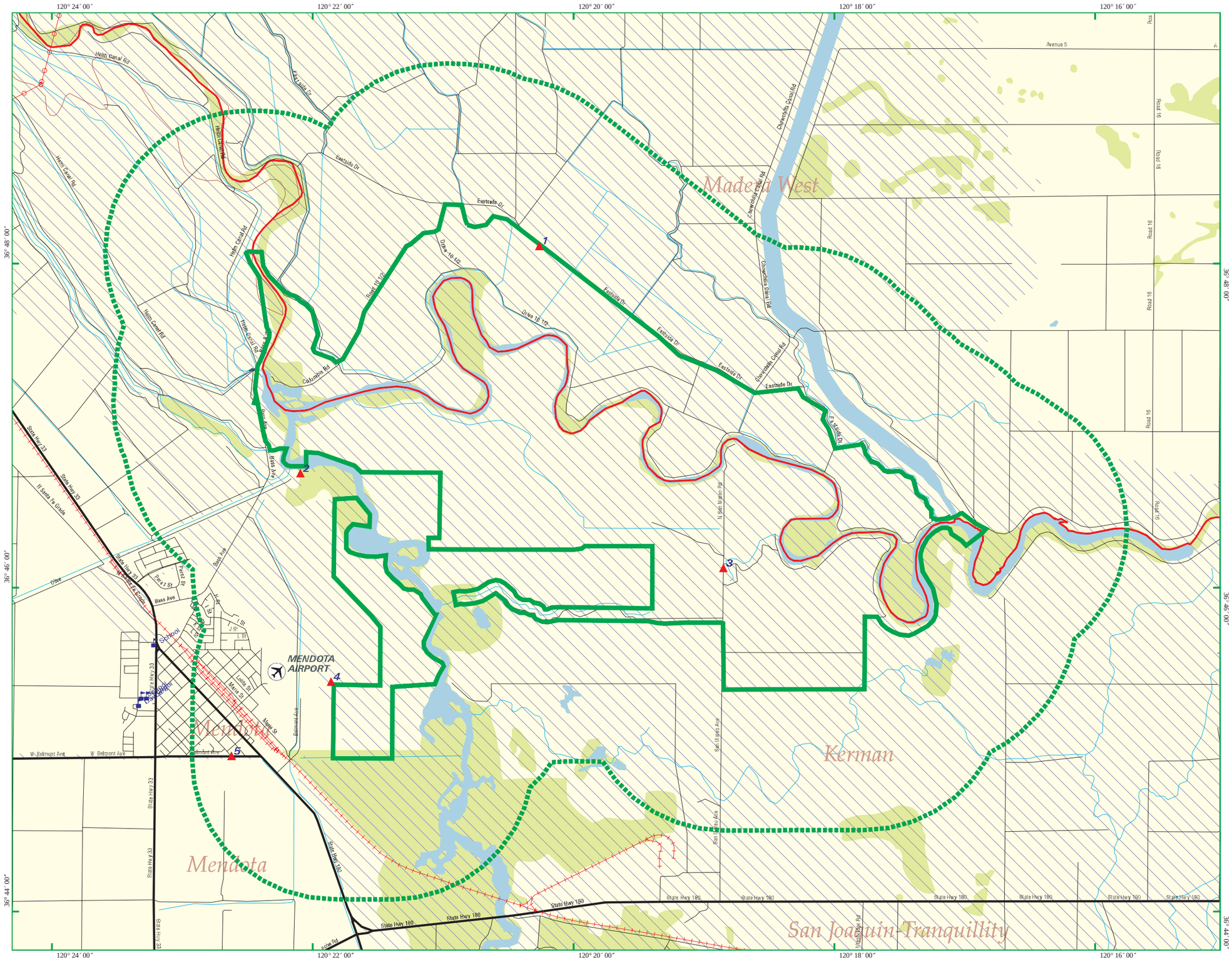
EDR DataMap®
Area Study

San Joaquin River Restoration Project Alternatives



- Listed Sites
- Earthquake Epicenters (Richter 5 or greater)
- Search Boundary
- Roads
- Major Roads
- Waterways
- Railroads
- Contour Lines
- Pipelines
- Powerlines
- Fault Lines
- Water
- Superfund Sites
- Federal DOD Sites
- Indian Reservations BIA
- 100-Yr Flood Zones
- National Wetland Inventory

Mendota, CA

0 1/2 1

Scale in Miles

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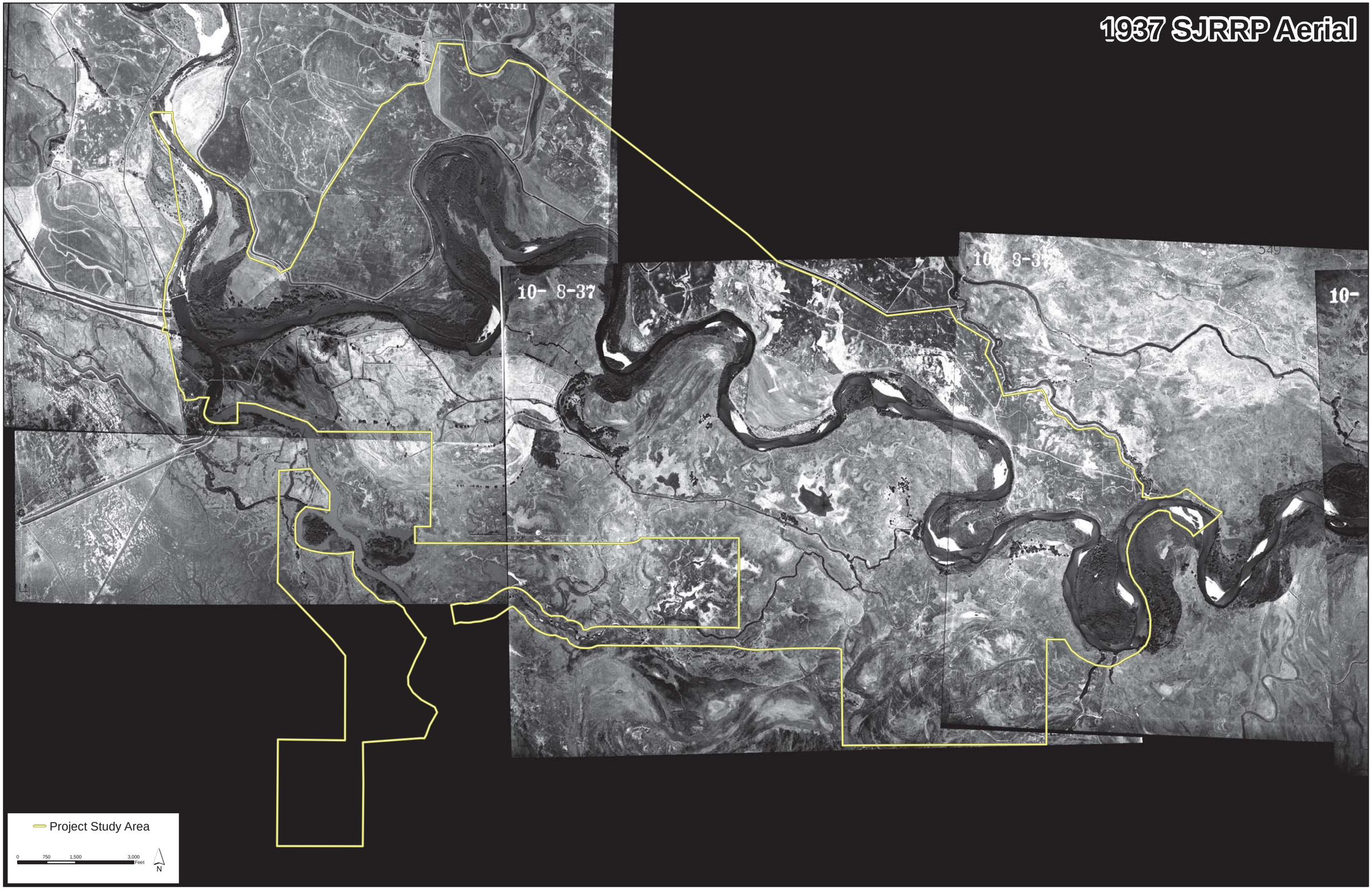
3196001.1s - 31 Oct 11

Attachment B

Historical Documentation

1937 SJRRP Aerial



1987 SJRRP Aerial

Project Study Area

0 750 1,500 3,000 Feet

N

2009 SJRRP Aerial

March 2010 SJRRP Aerial

Project Study Area

0 750 1,500 3,000 Feet

N

April 2010 SJRRP Aerial

Project Study Area

0 750 1,500 3,000 Feet

N

May 2010 SJRRP Aerial

Project Study Area

0 750 1,500 3,000 Feet

N

June 2010 SJRRP Aerial

Project Study Area

0 750 1,500 3,000 Feet

N

San Joaquin River Restoration Project Alternatives

San Joaquin River Restoration Project Alternatives

Mendota, CA 93640

Inquiry Number: 3196001.2

October 31, 2011

EDR Historical Topographic Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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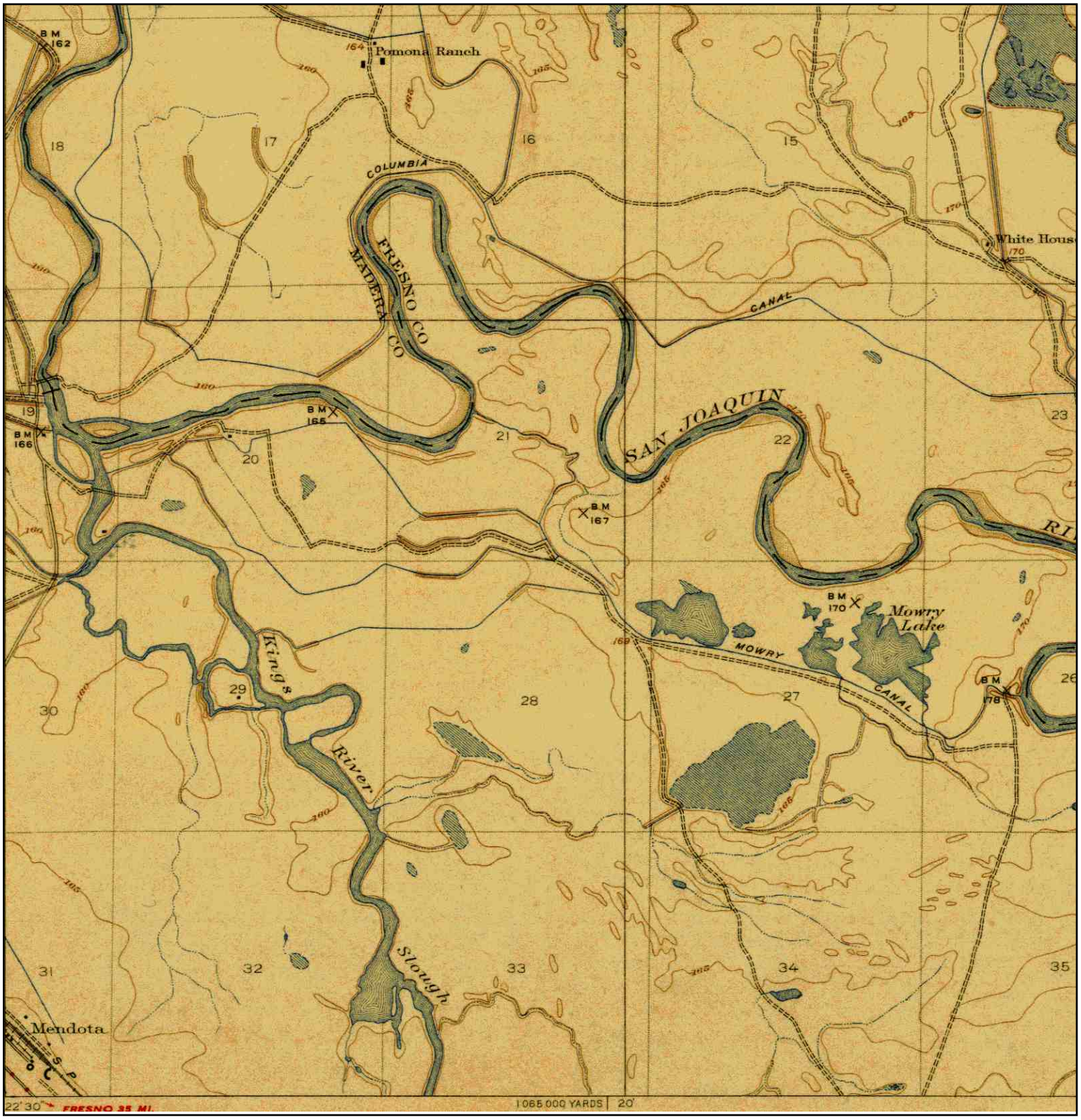
Historical Topographic Map

N	TARGET QUAD NAME: MENDOTA=MENDOTA DAM MAP YEAR: 1924 SERIES: 7.5 SCALE: 1:31680	SITE NAME: San Joaquin River Restoration Project Alternatives ADDRESS: San Joaquin River Restoration Project Alternatives Mendota, CA 93640 LAT/LONG: 36.7737 / -120.3304	CLIENT: URS Corporation CONTACT: Joe Morgan INQUIRY#: 3196001.2 RESEARCH DATE: 10/31/2011

Historical Topographic Map



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Historical Topographic Map

N	TARGET QUAD NAME: MENDOTA=MENDOTA DAM MAP YEAR: 1924 SERIES: 7.5 SCALE: 1:31680	SITE NAME: San Joaquin River Restoration Project Alternatives ADDRESS: San Joaquin River Restoration Project Alternatives Mendota, CA 93640 LAT/LONG: 36.7737 / -120.3304	CLIENT: URS Corporation CONTACT: Joe Morgan INQUIRY#: 3196001.2 RESEARCH DATE: 10/31/2011

Historical Topographic Map

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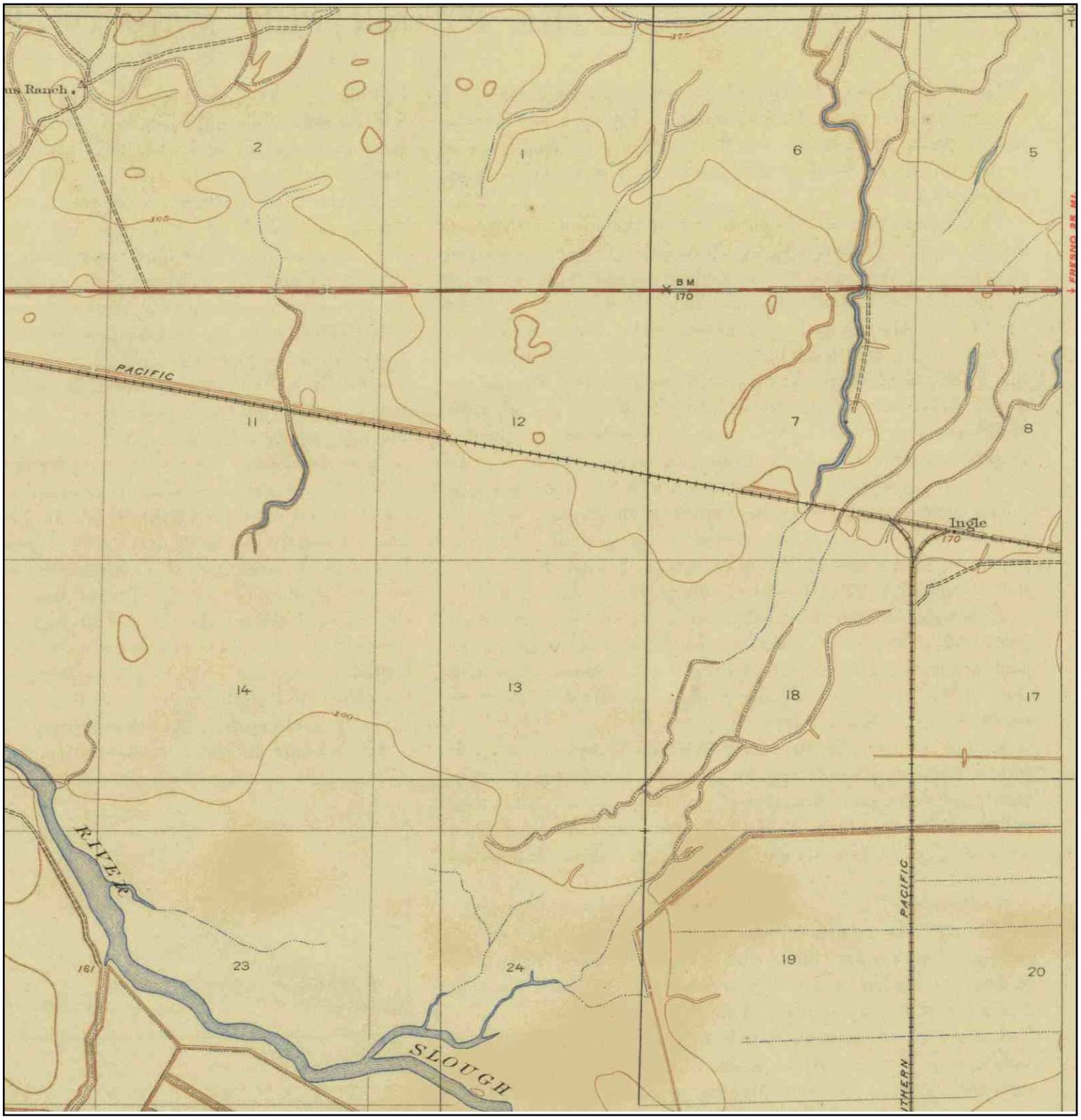
Historical Topographic Map

N	TARGET QUAD NAME: TRANQUILLITY MAP YEAR: 1924 SERIES: 7.5 SCALE: 1:31680	SITE NAME: San Joaquin River Restoration Project Alternatives ADDRESS: San Joaquin River Restoration Project Alternatives Mendota, CA 93640 LAT/LONG: 36.7737 / -120.3304	CLIENT: URS Corporation CONTACT: Joe Morgan INQUIRY#: 3196001.2 RESEARCH DATE: 10/31/2011

Historical Topographic Map



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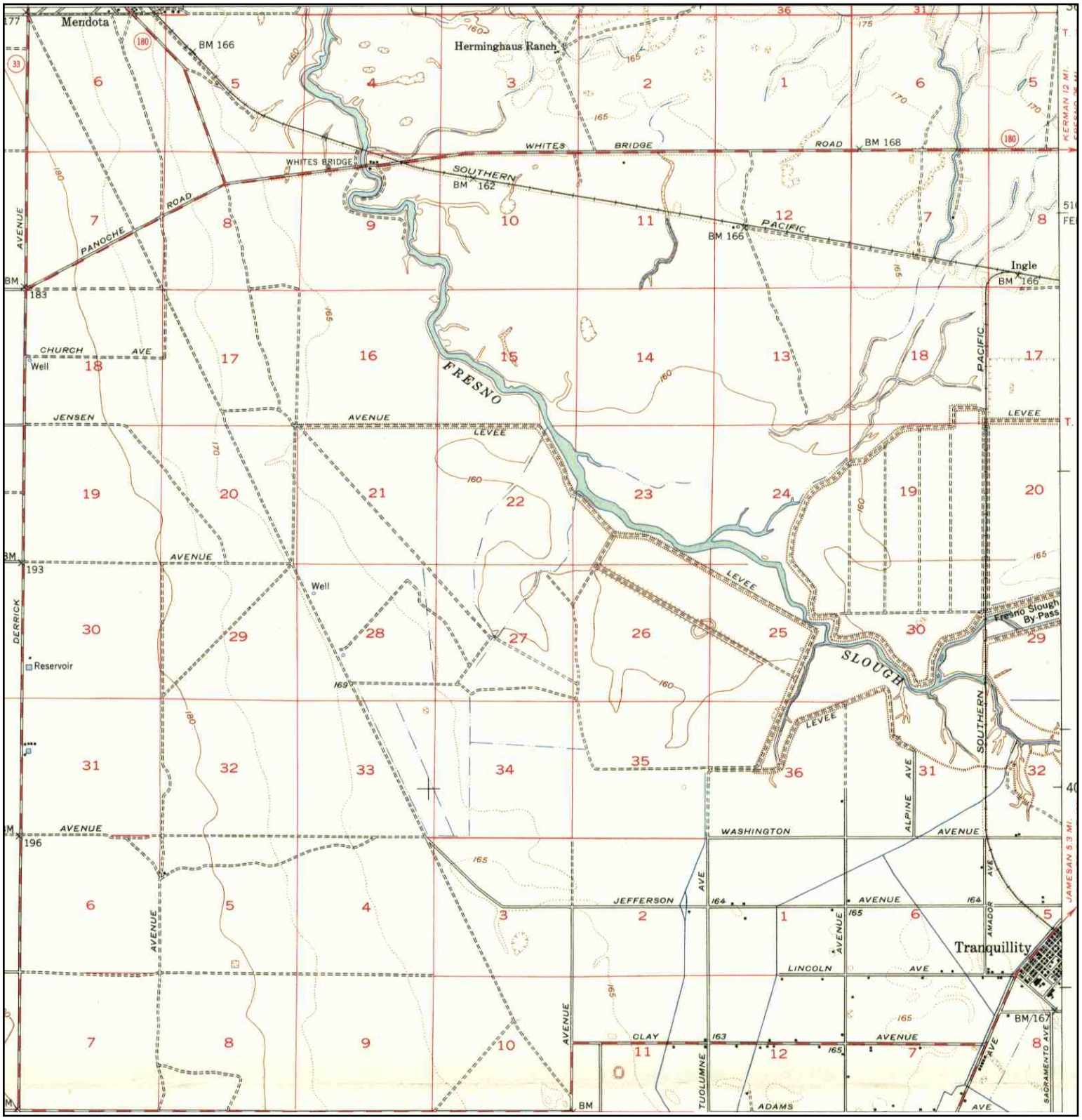
Historical Topographic Map



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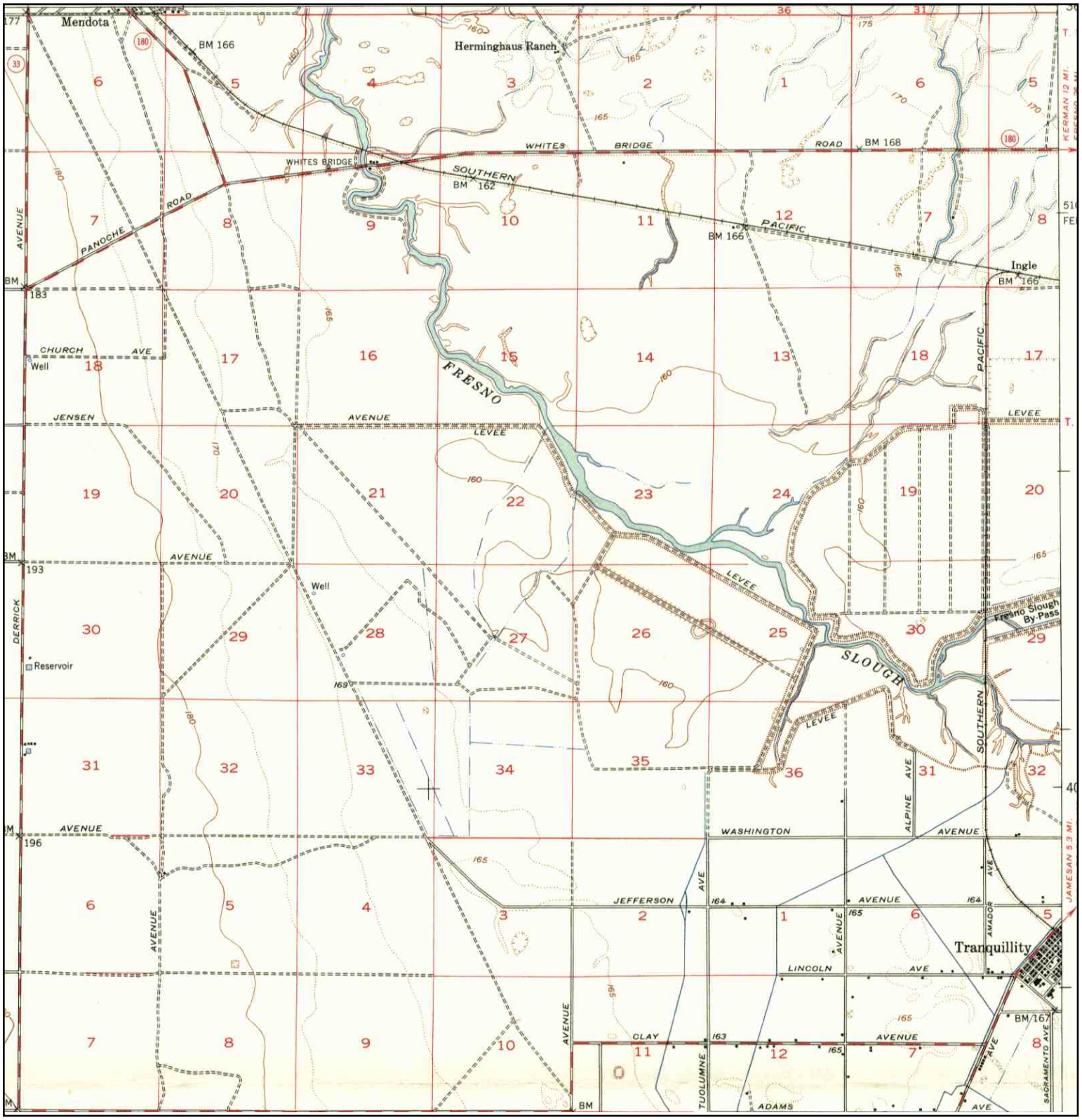
	NAME:	TRANQUILLITY			CONTACT: Joe Morgan
	MAP YEAR:	1946	ADDRESS:	San Joaquin River Restoration Project Alternatives	INQUIRY#: 3196001.2
	SERIES:	15		Mendota, CA 93640	RESEARCH DATE: 10/31/2011
	SCALE:	1:62500	LAT/LONG:	36.7737 / -120.3304	

Historical Topographic Map



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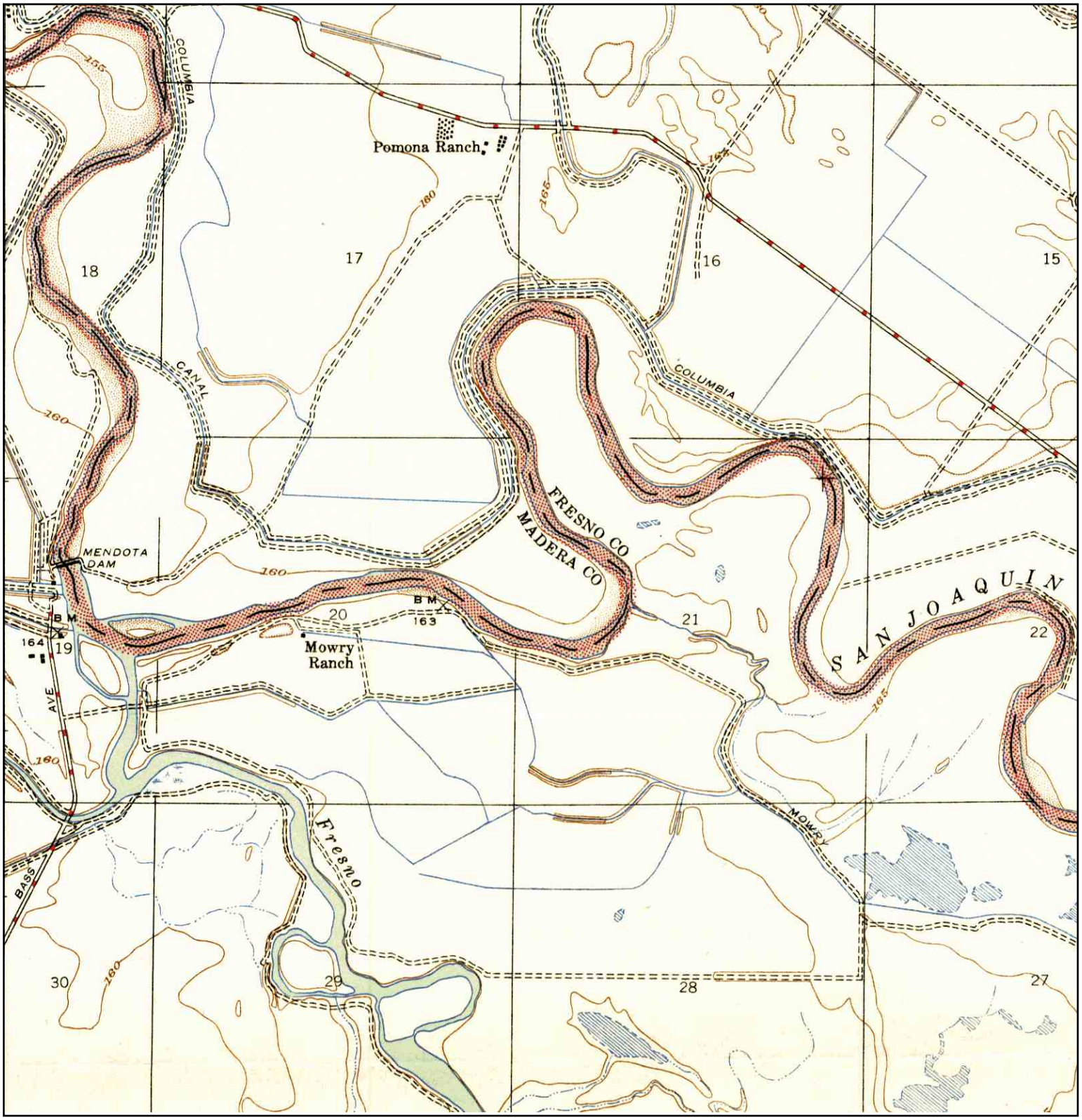
	NAME:	TRANQUILLITY			CONTACT: Joe Morgan
	MAP YEAR:	1946	ADDRESS:	San Joaquin River Restoration Project Alternatives	INQUIRY#: 3196001.2
	SERIES:	15		Mendota, CA 93640	RESEARCH DATE: 10/31/2011
	SCALE:	1:62500	LAT/LONG:	36.7737 / -120.3304	

Historical Topographic Map



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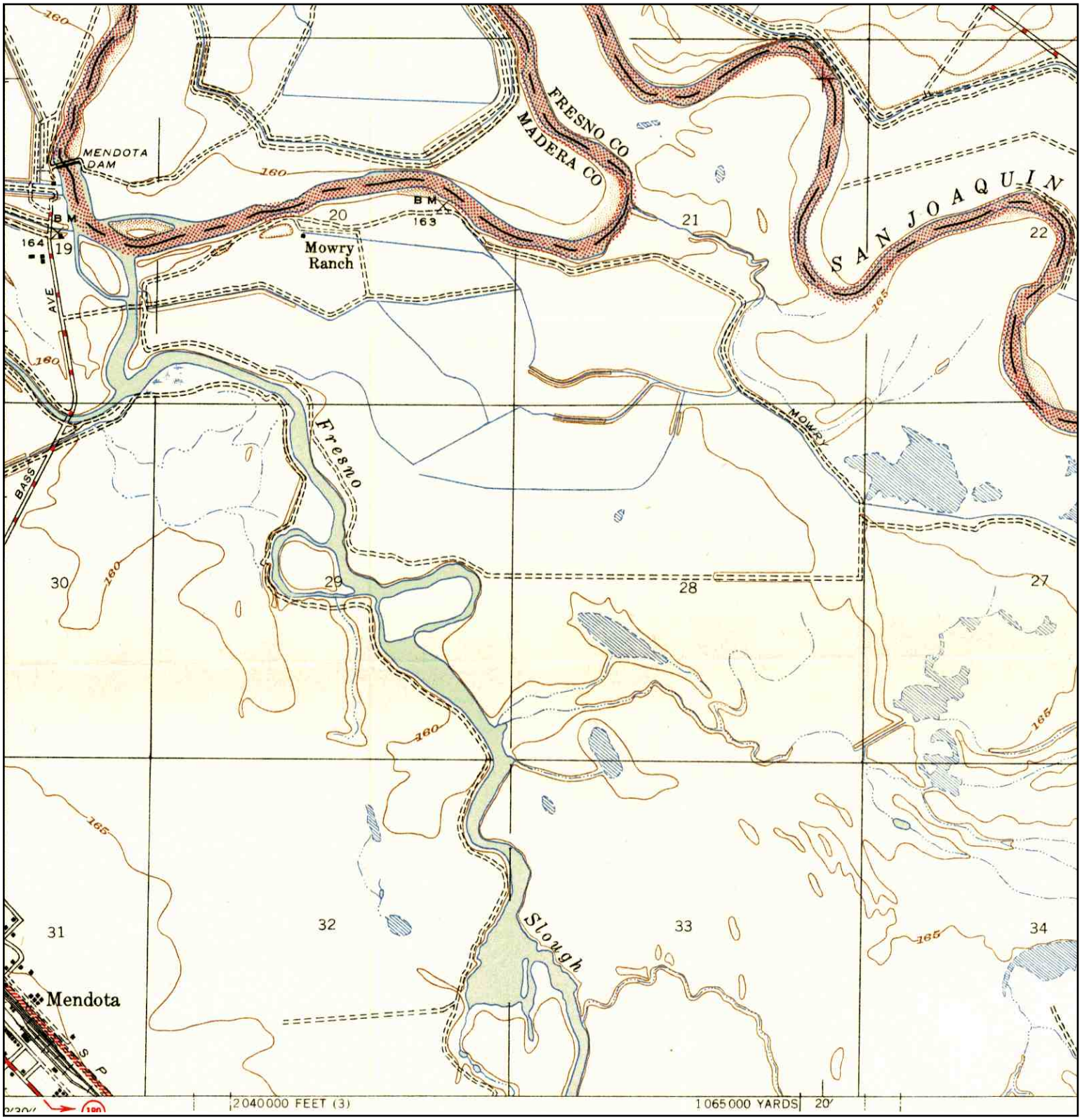
Historical Topographic Map



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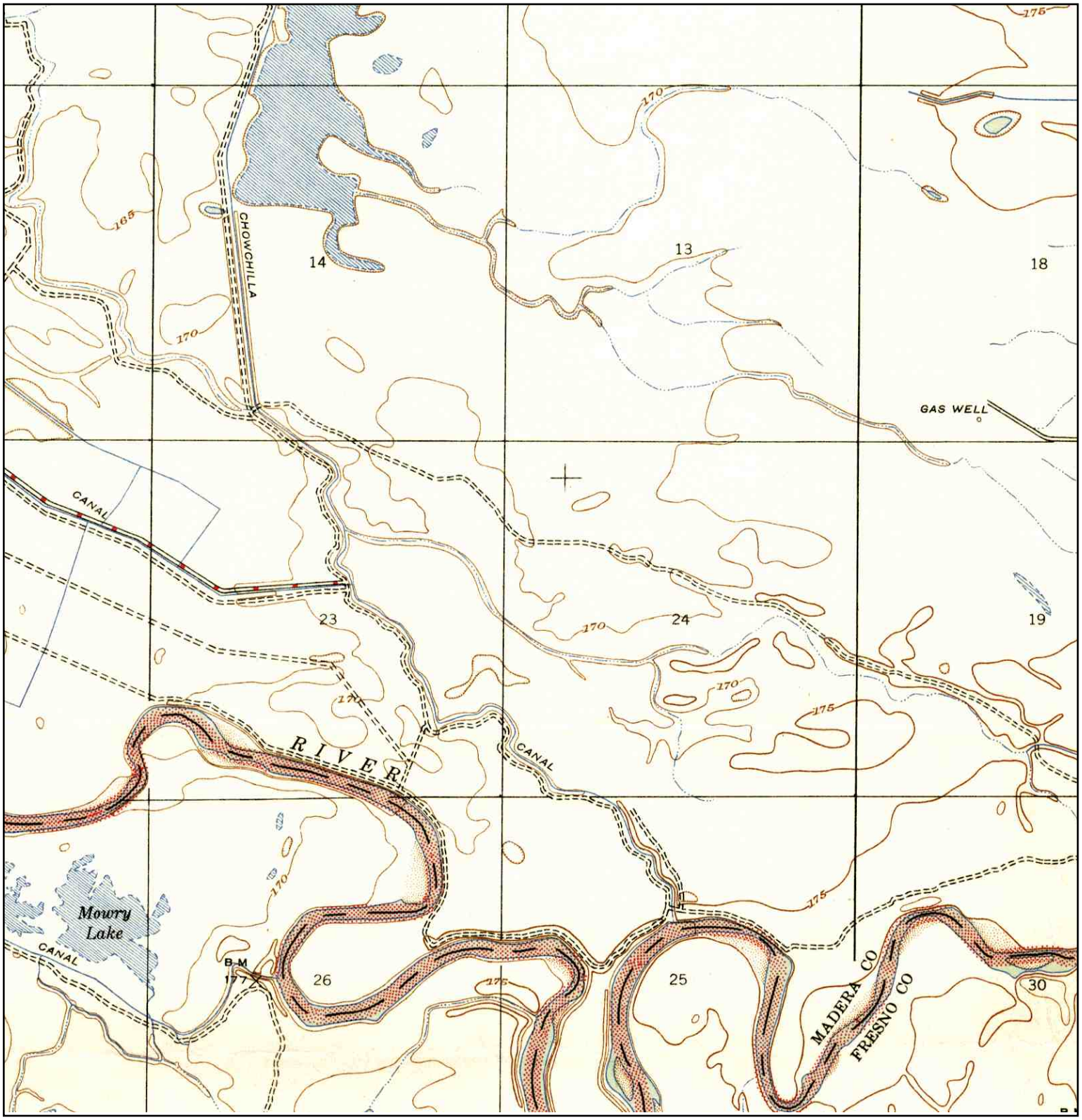
Historical Topographic Map



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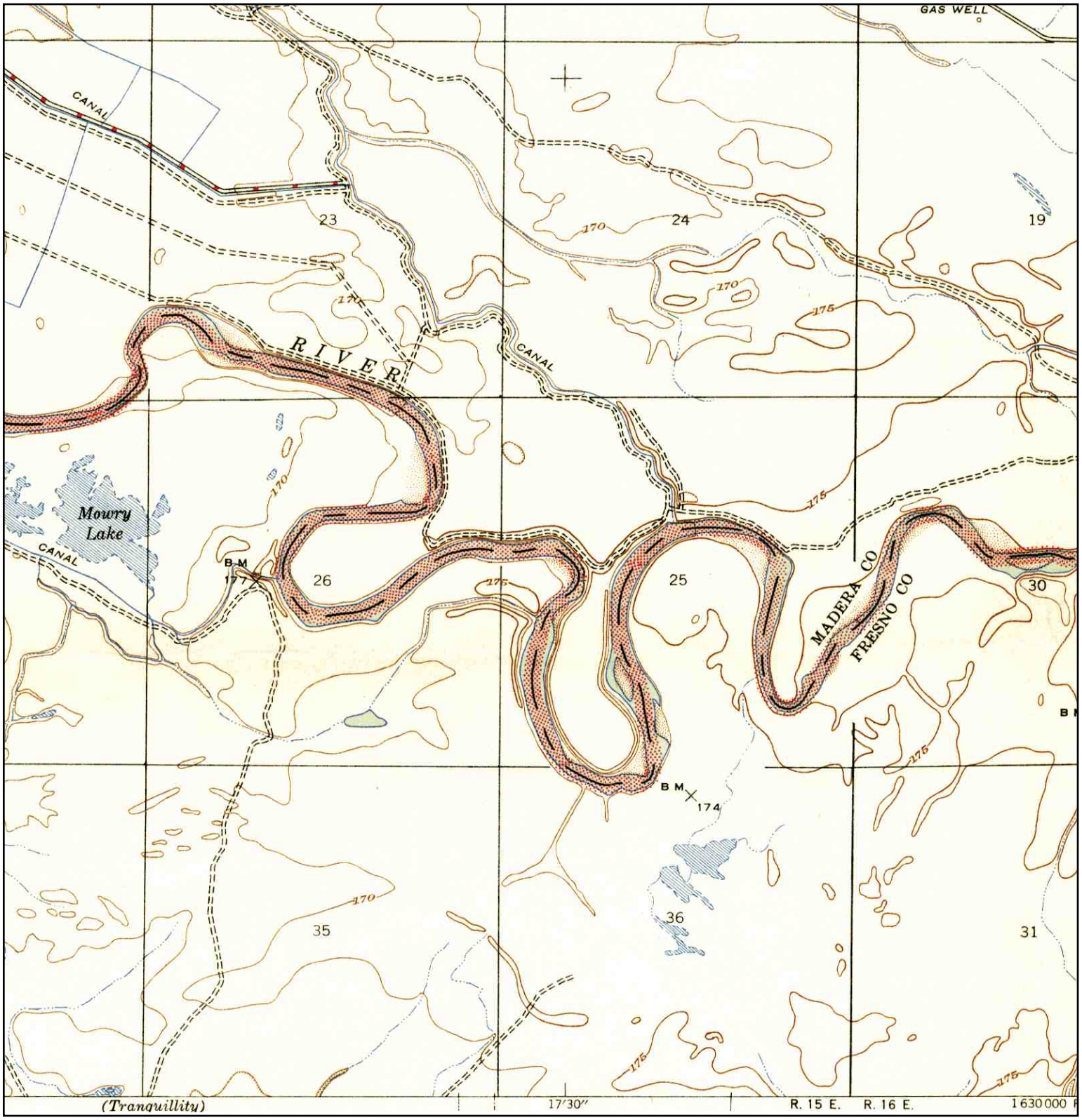
Historical Topographic Map



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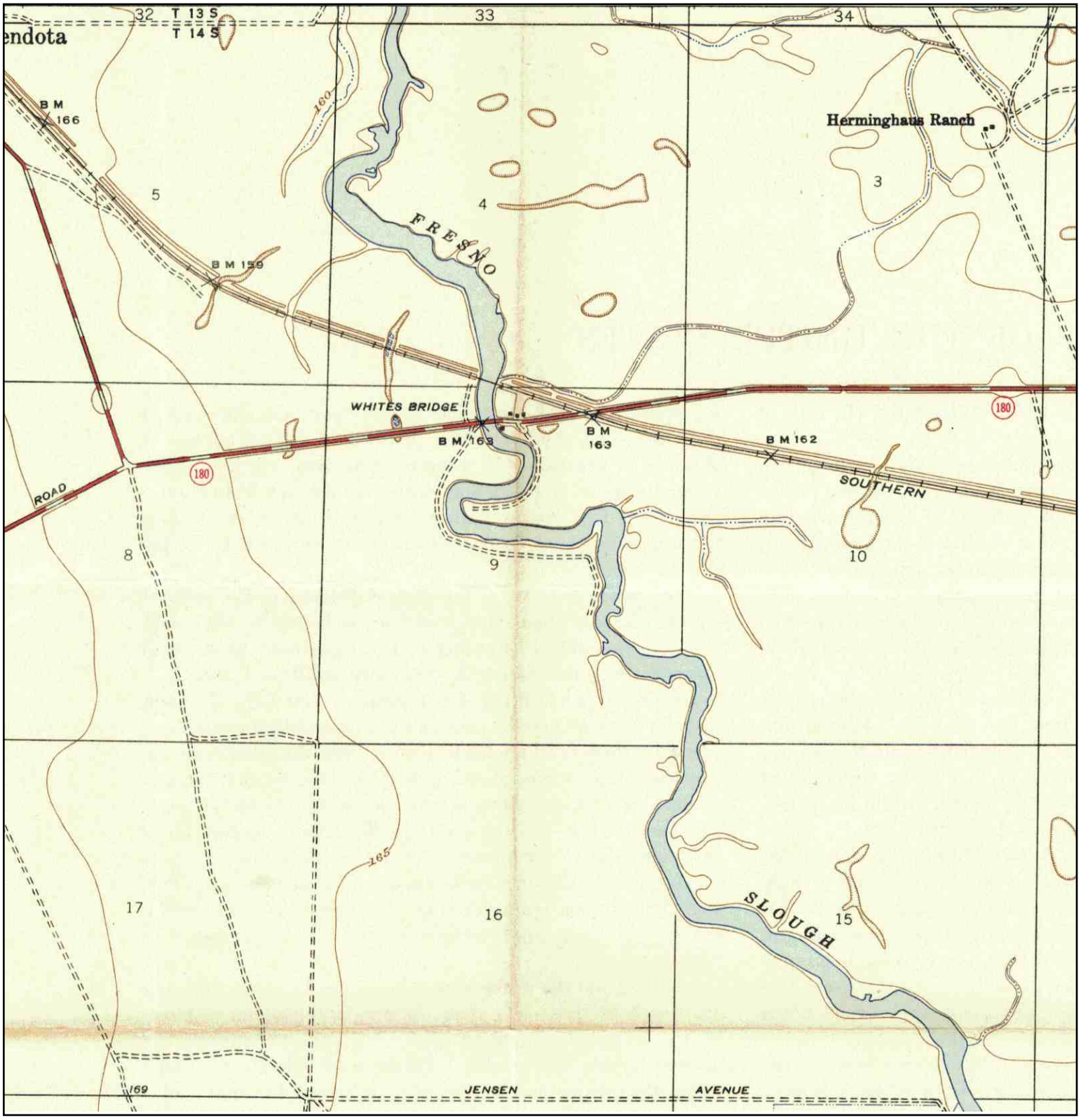
Historical Topographic Map



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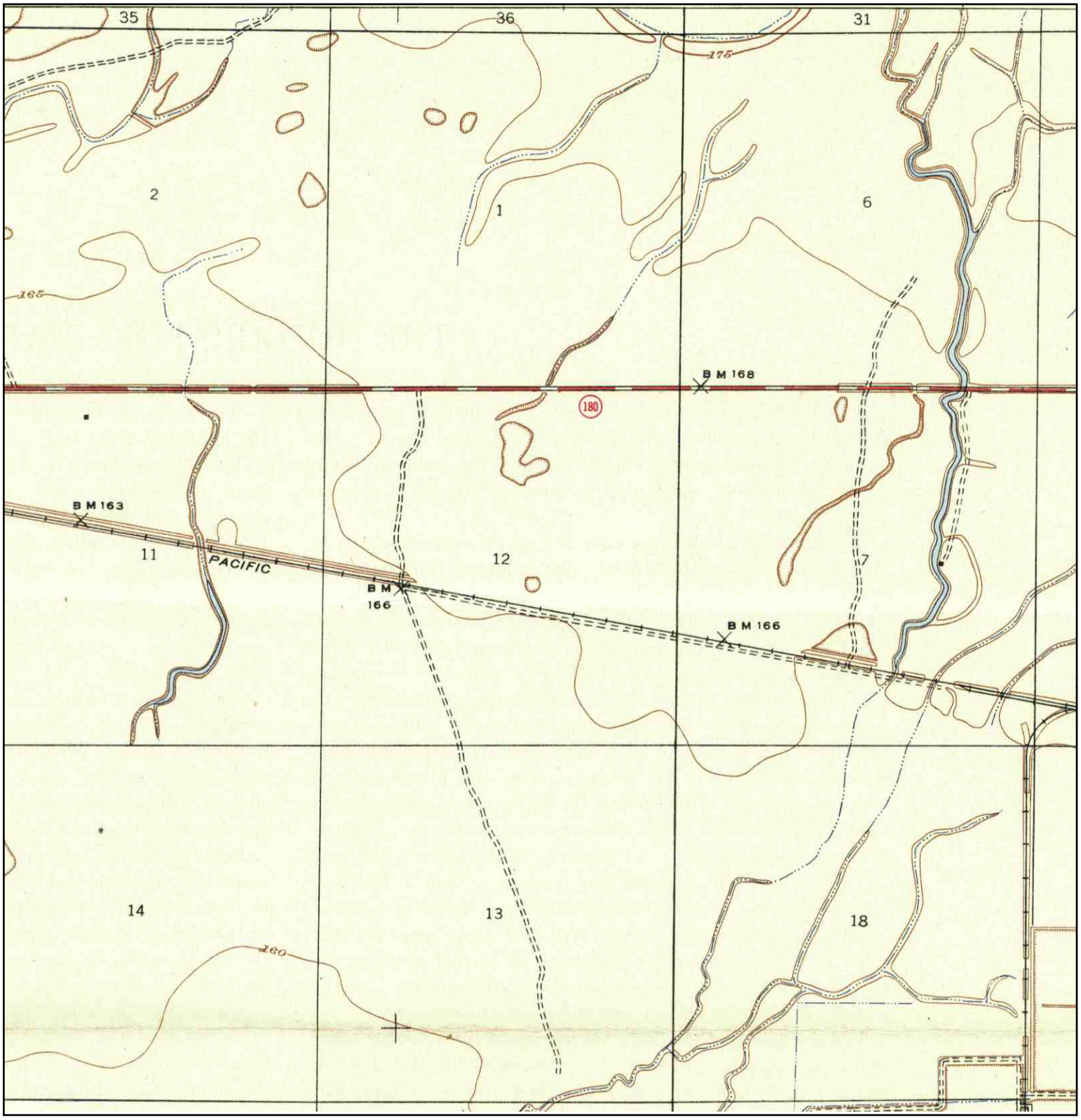
Historical Topographic Map



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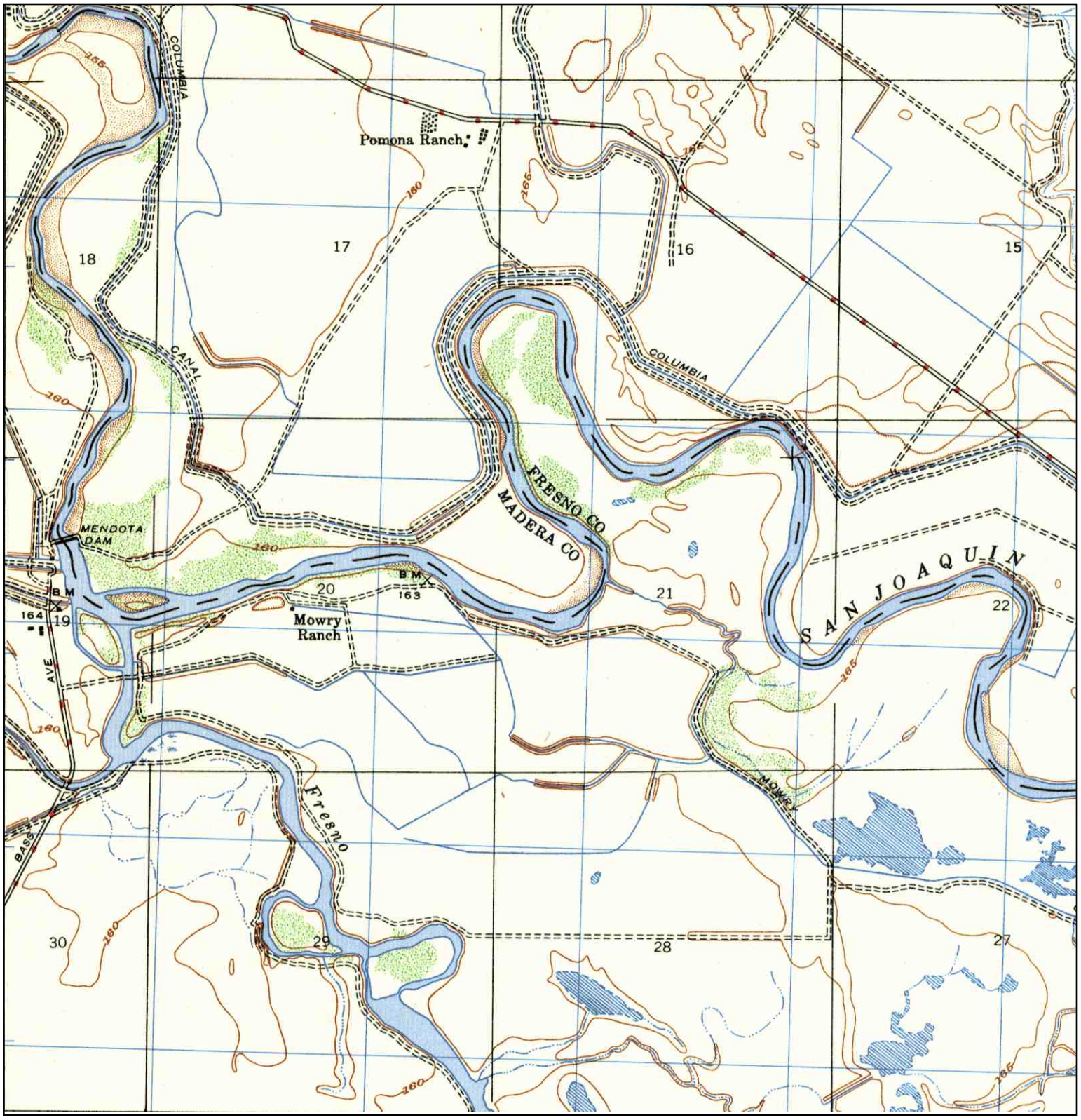

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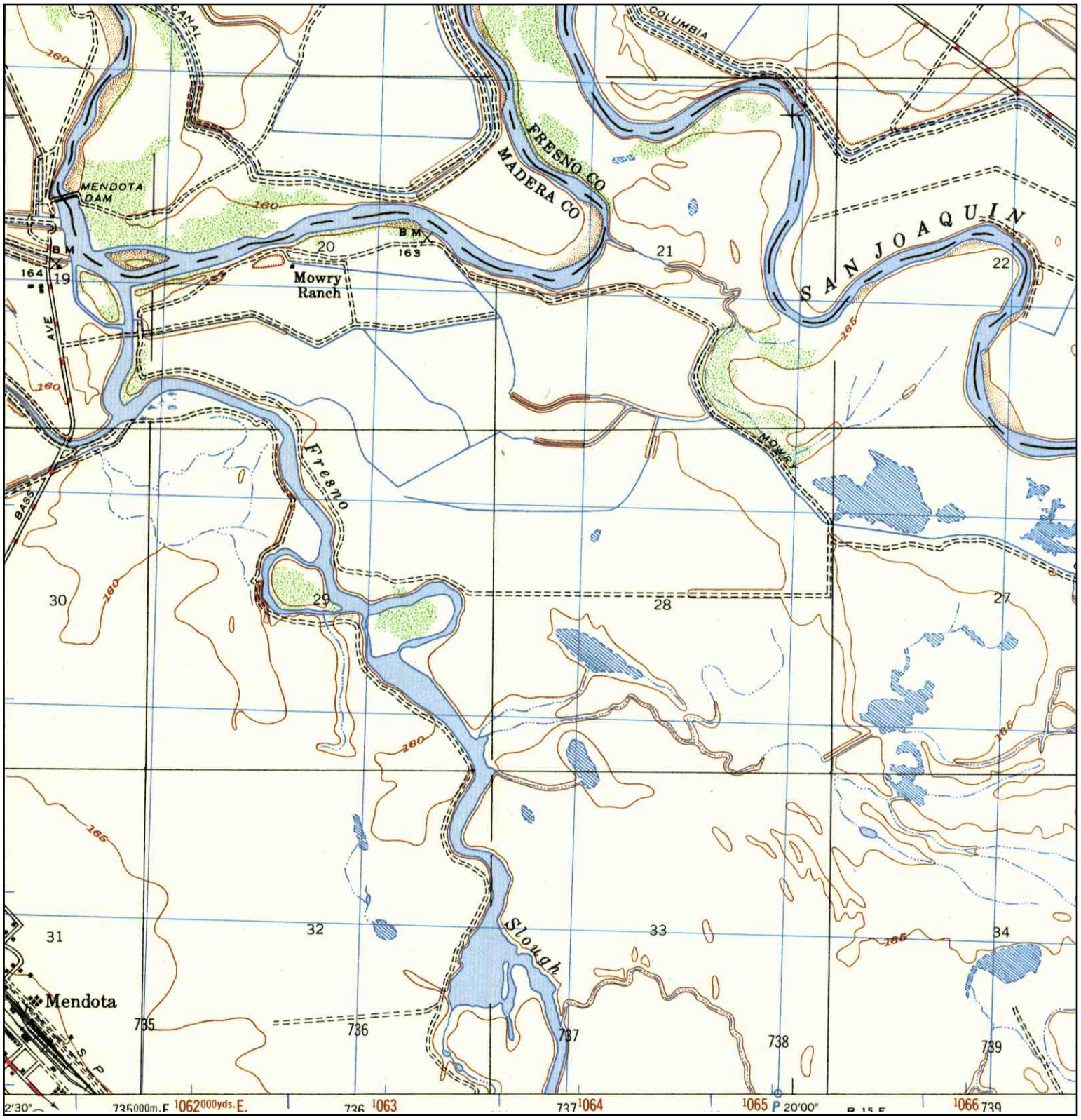

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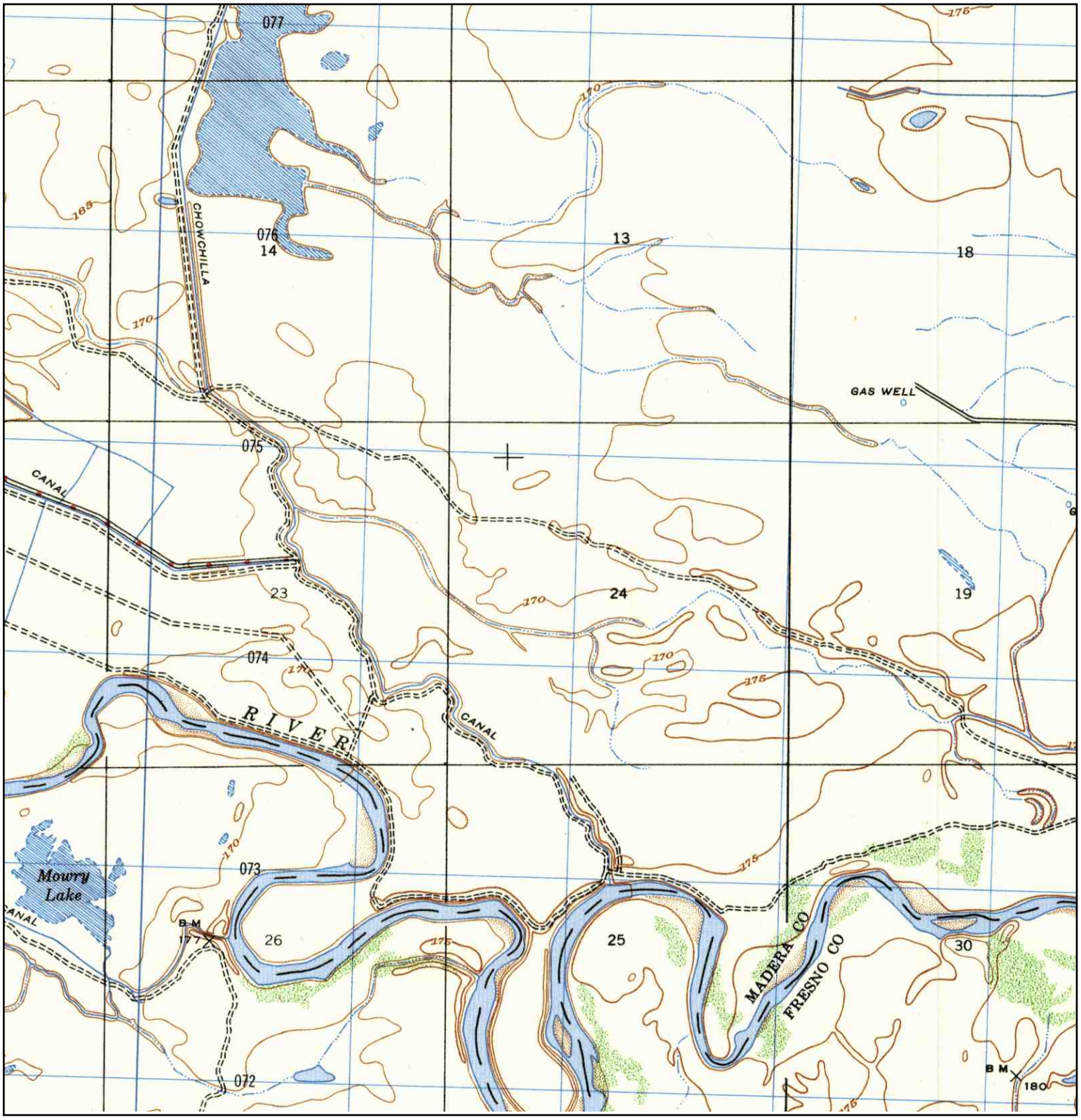

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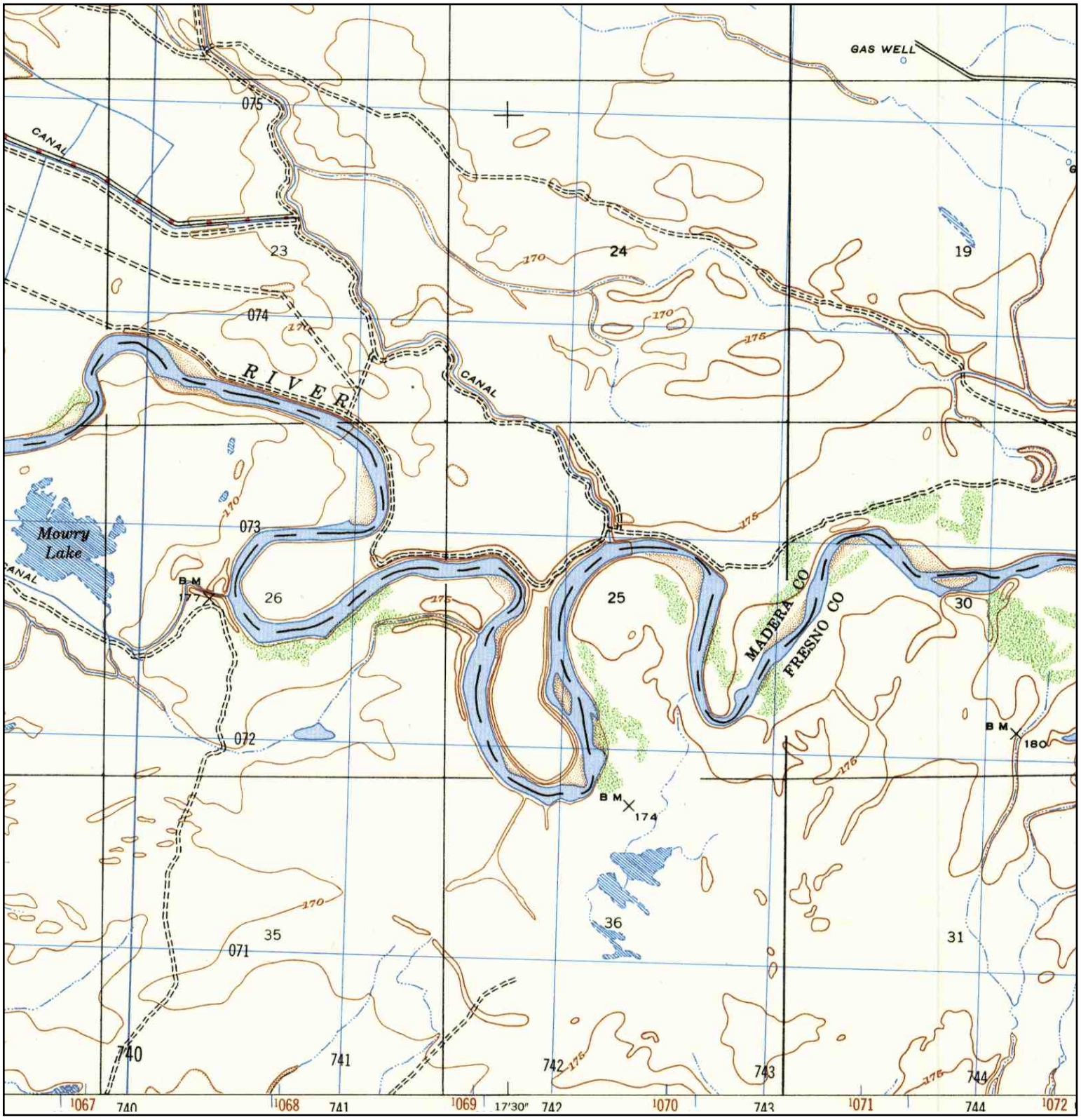

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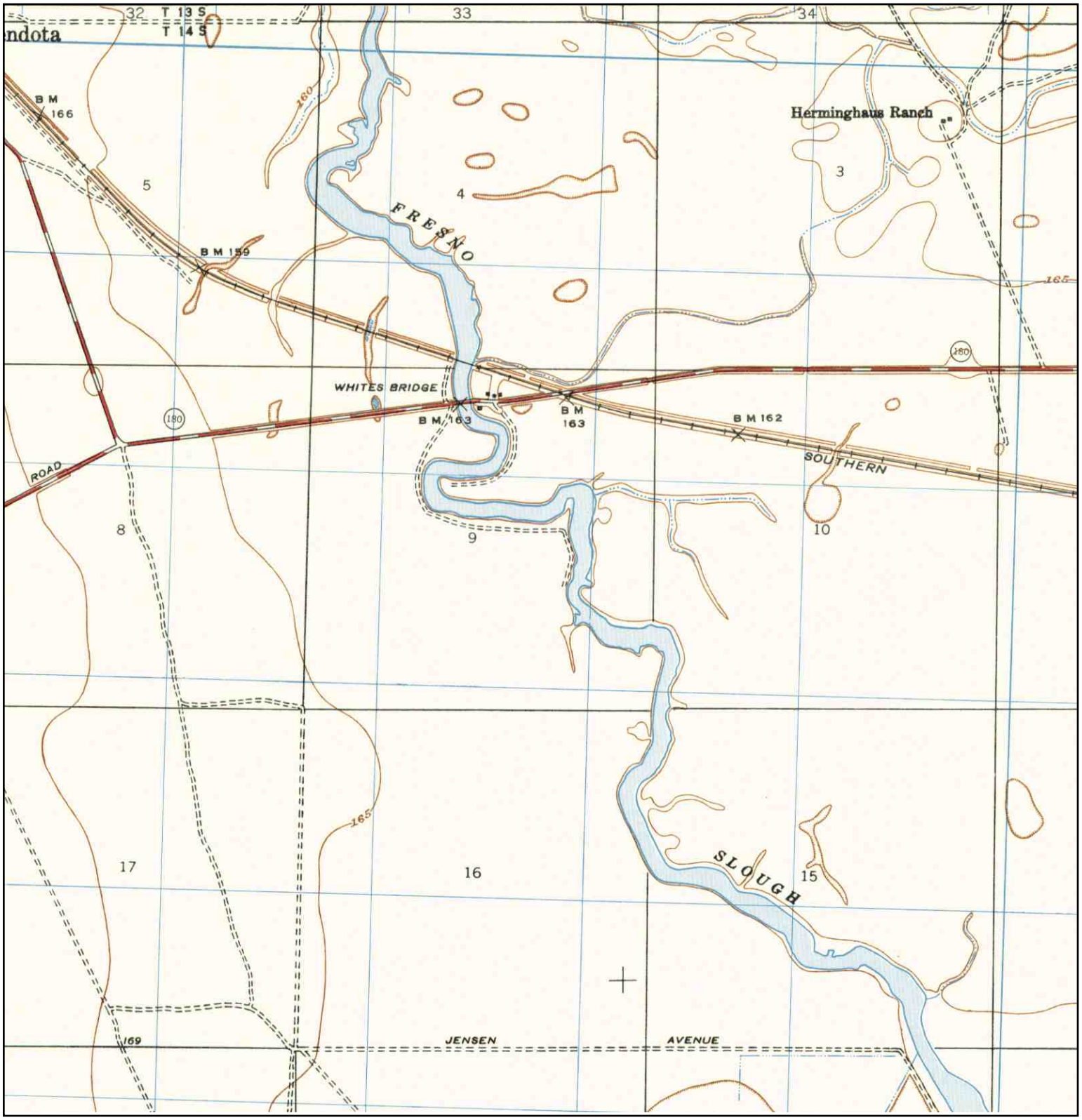

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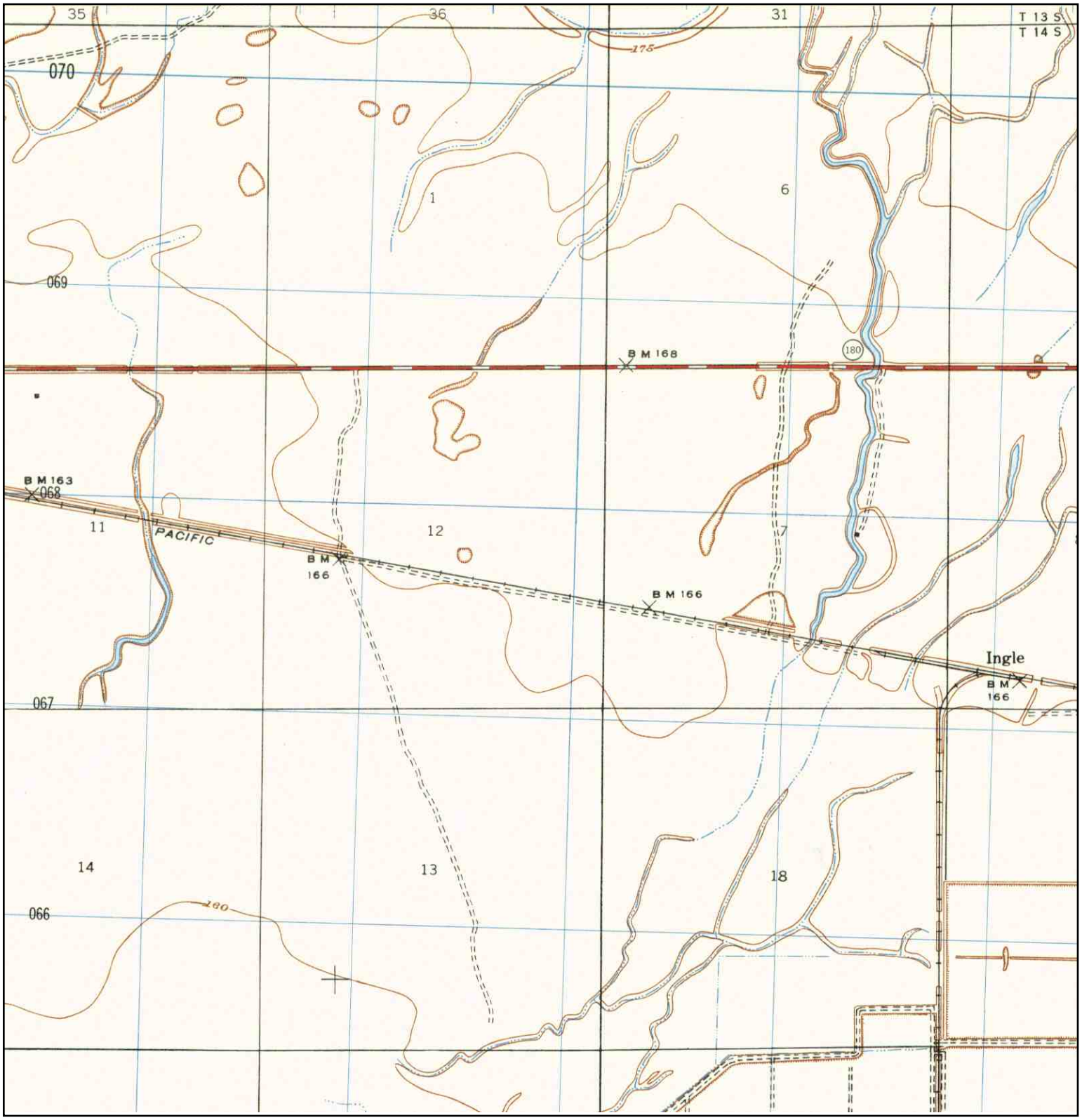

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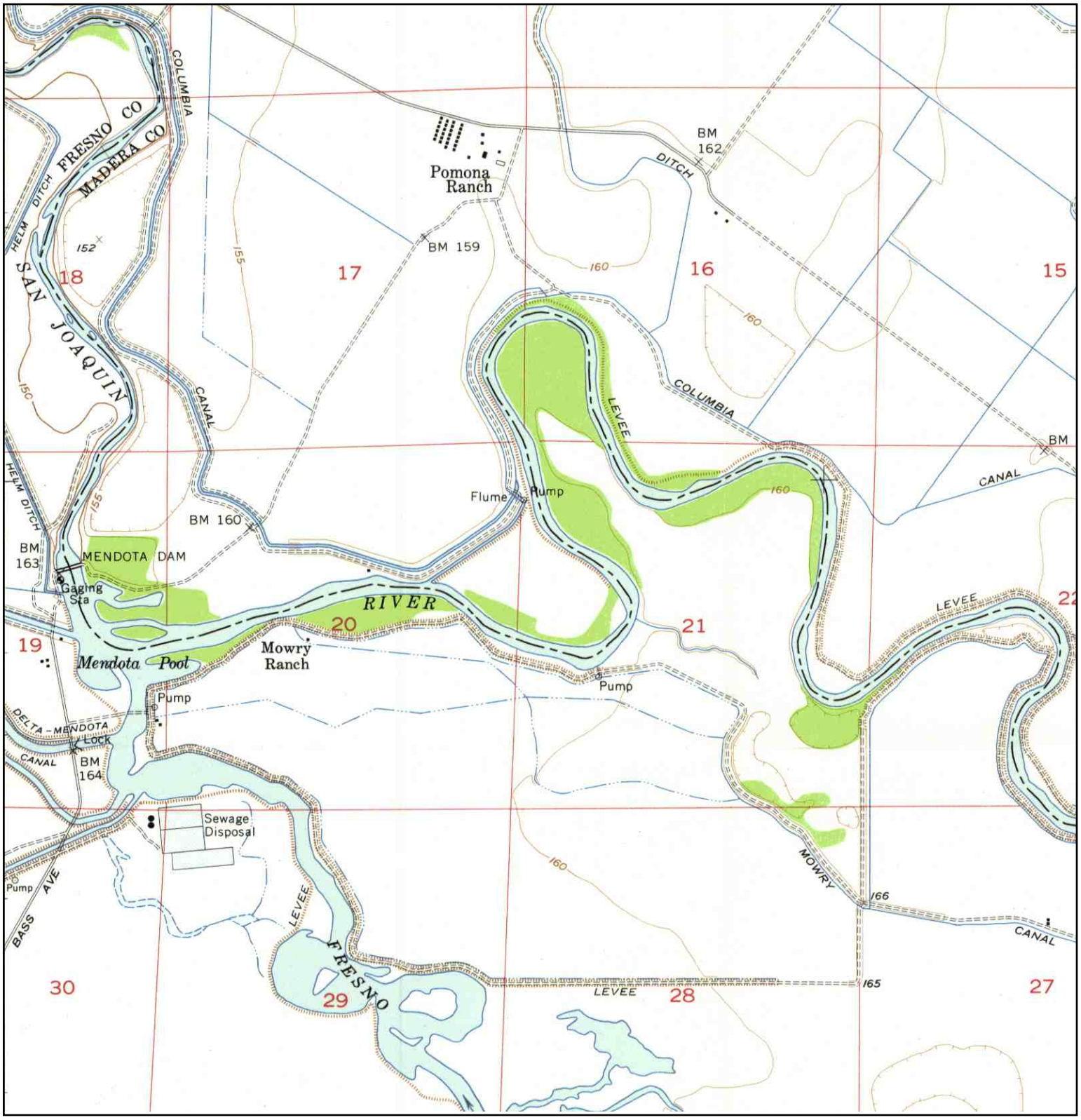

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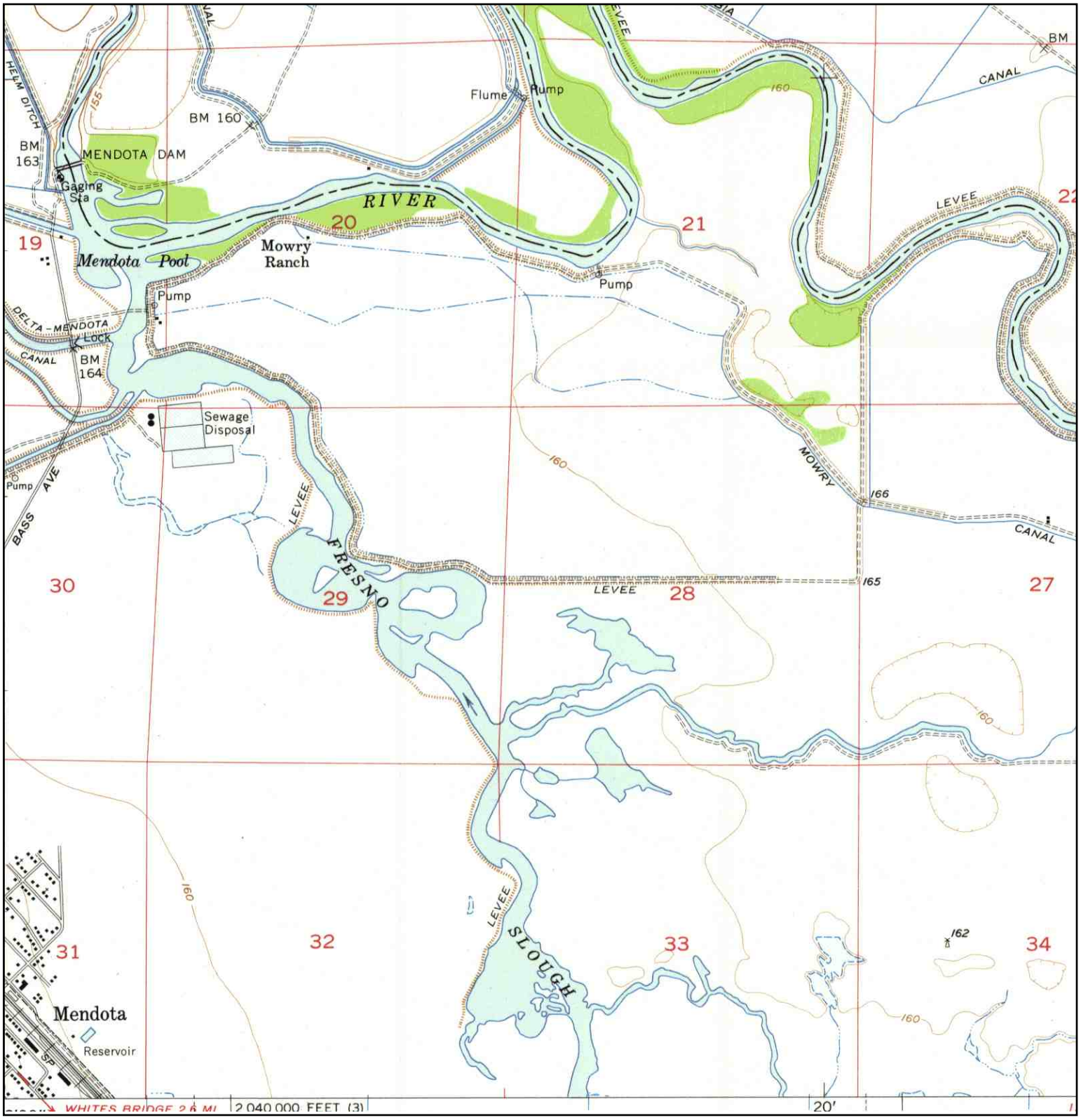

N	TARGET QUAD				
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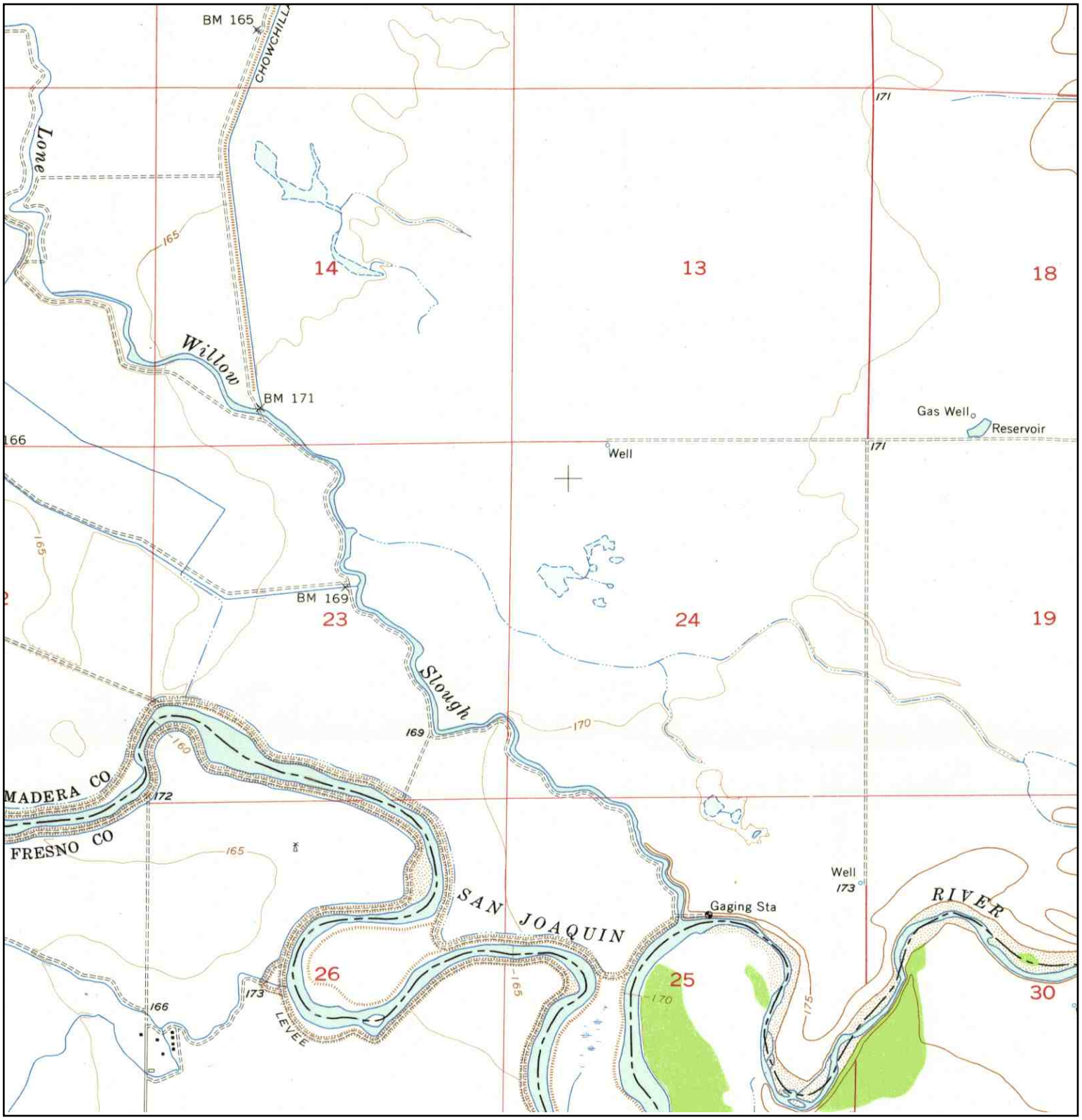
	MAP YEAR:	1956	ADDRESS:	San Joaquin River Restoration Project Alternatives	CONTACT: Joe Morgan
	SERIES:	7.5		Mendota, CA 93640	INQUIRY#: 3196001.2
	SCALE:	1:24000	LAT/LONG:	36.7737 / -120.3304	RESEARCH DATE: 10/31/2011

Historical Topographic Map



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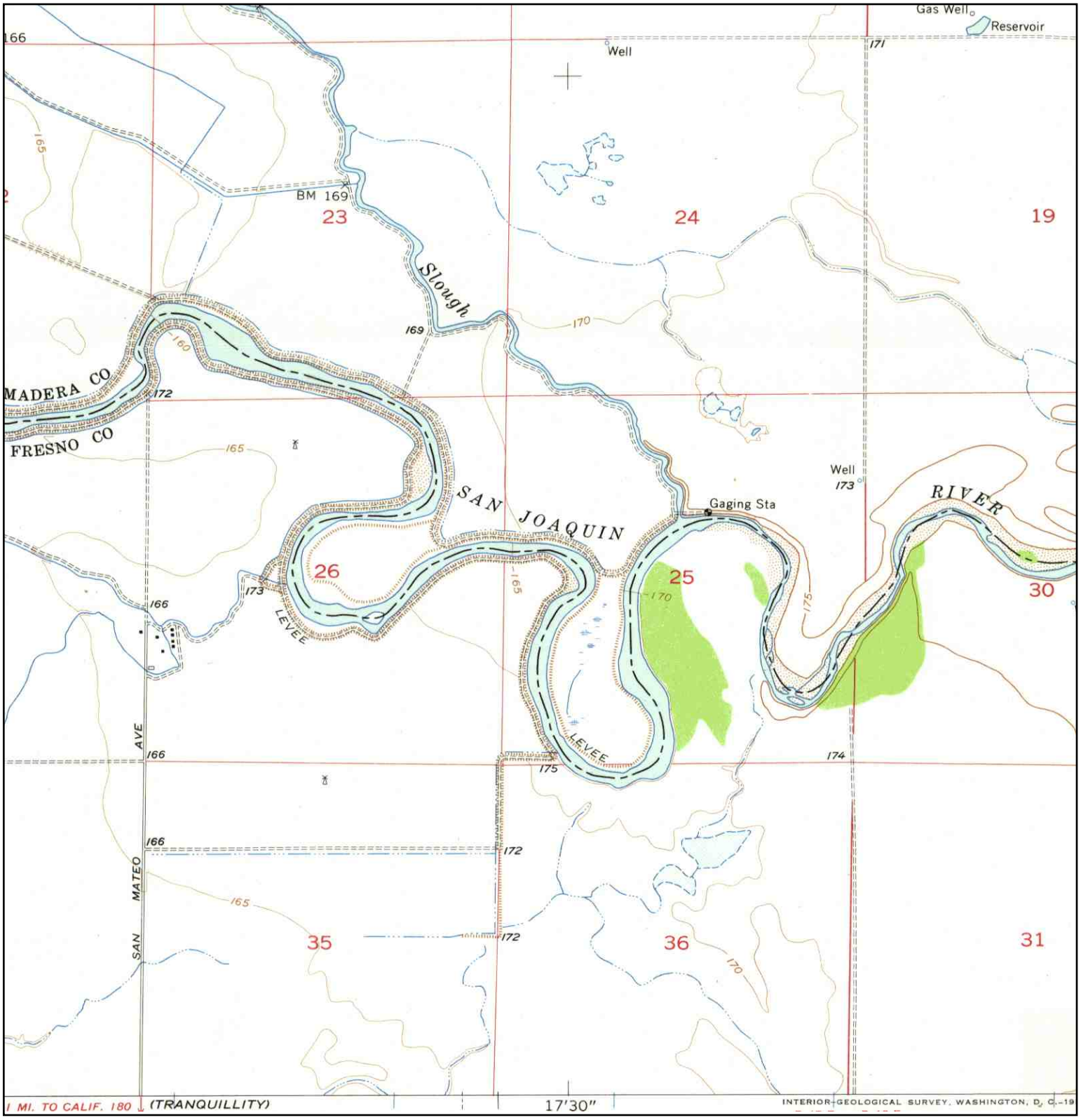

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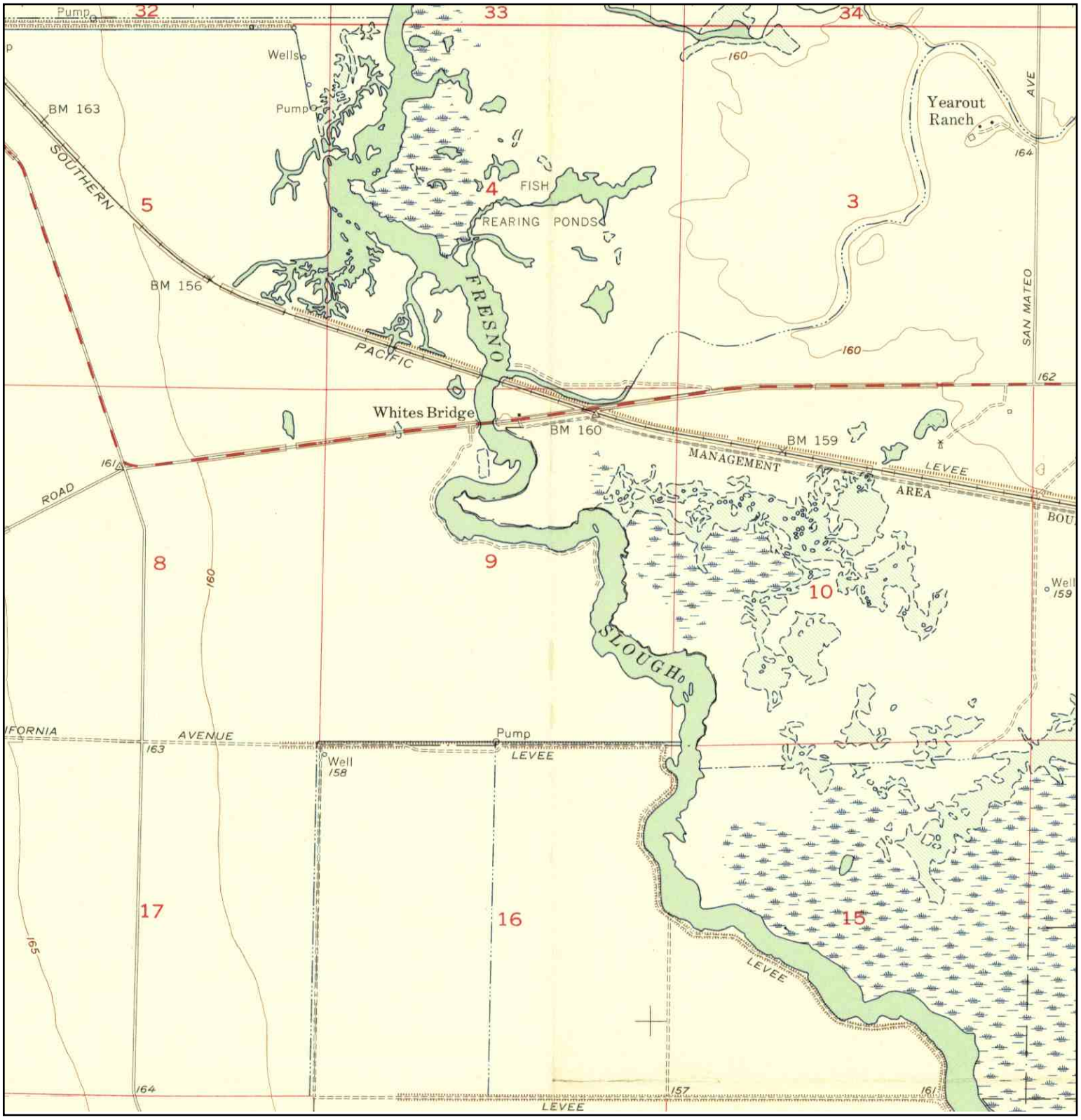

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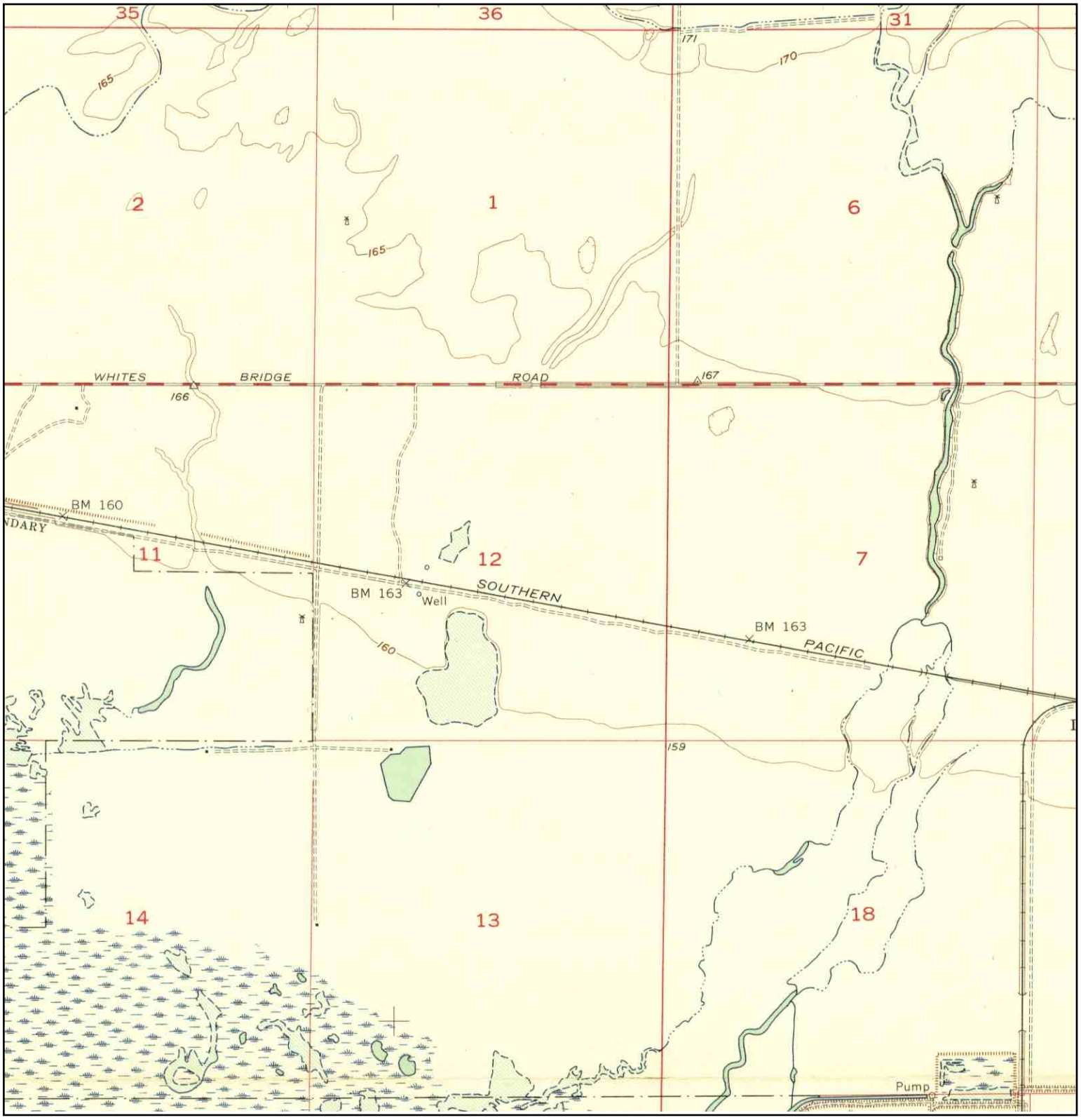

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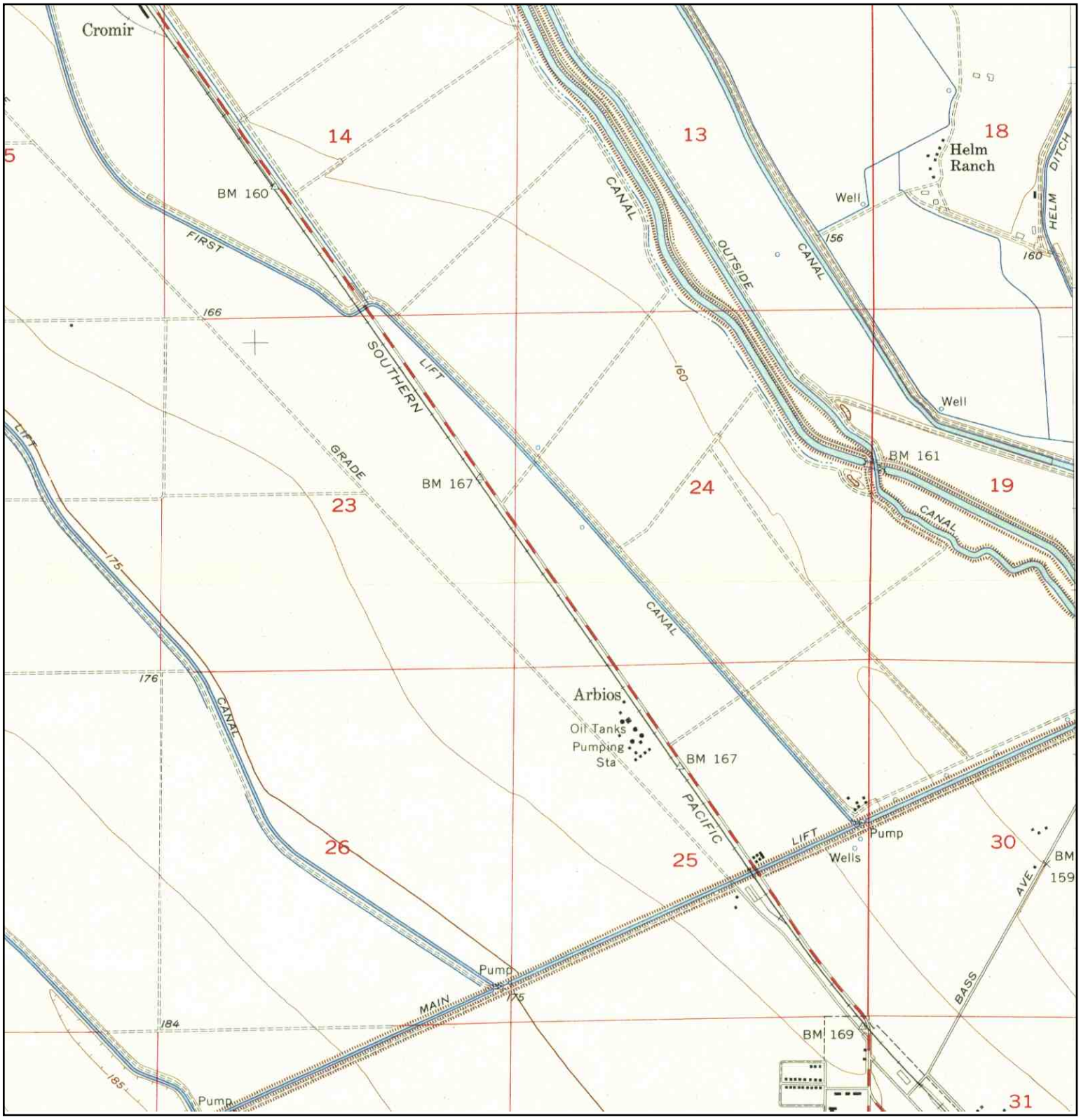

N	TARGET QUAD NAME: FIREBAUGH MAP YEAR: 1956 SERIES: 7.5 SCALE: 1:24000	SITE NAME: San Joaquin River Restoration Project Alternatives ADDRESS: San Joaquin River Restoration Project Alternatives Mendota, CA 93640 LAT/LONG: 36.7737 / -120.3304	CLIENT: URS Corporation CONTACT: Joe Morgan INQUIRY#: 3196001.2 RESEARCH DATE: 10/31/2011

Historical Topographic Map

N	TARGET QUAD NAME: FIREBAUGH MAP YEAR: 1962 SERIES: 15 SCALE: 1:62500	SITE NAME: San Joaquin River Restoration Project Alternatives ADDRESS: San Joaquin River Restoration Project Alternatives Mendota, CA 93640 LAT/LONG: 36.7737 / -120.3304	CLIENT: URS Corporation CONTACT: Joe Morgan INQUIRY#: 3196001.2 RESEARCH DATE: 10/31/2011

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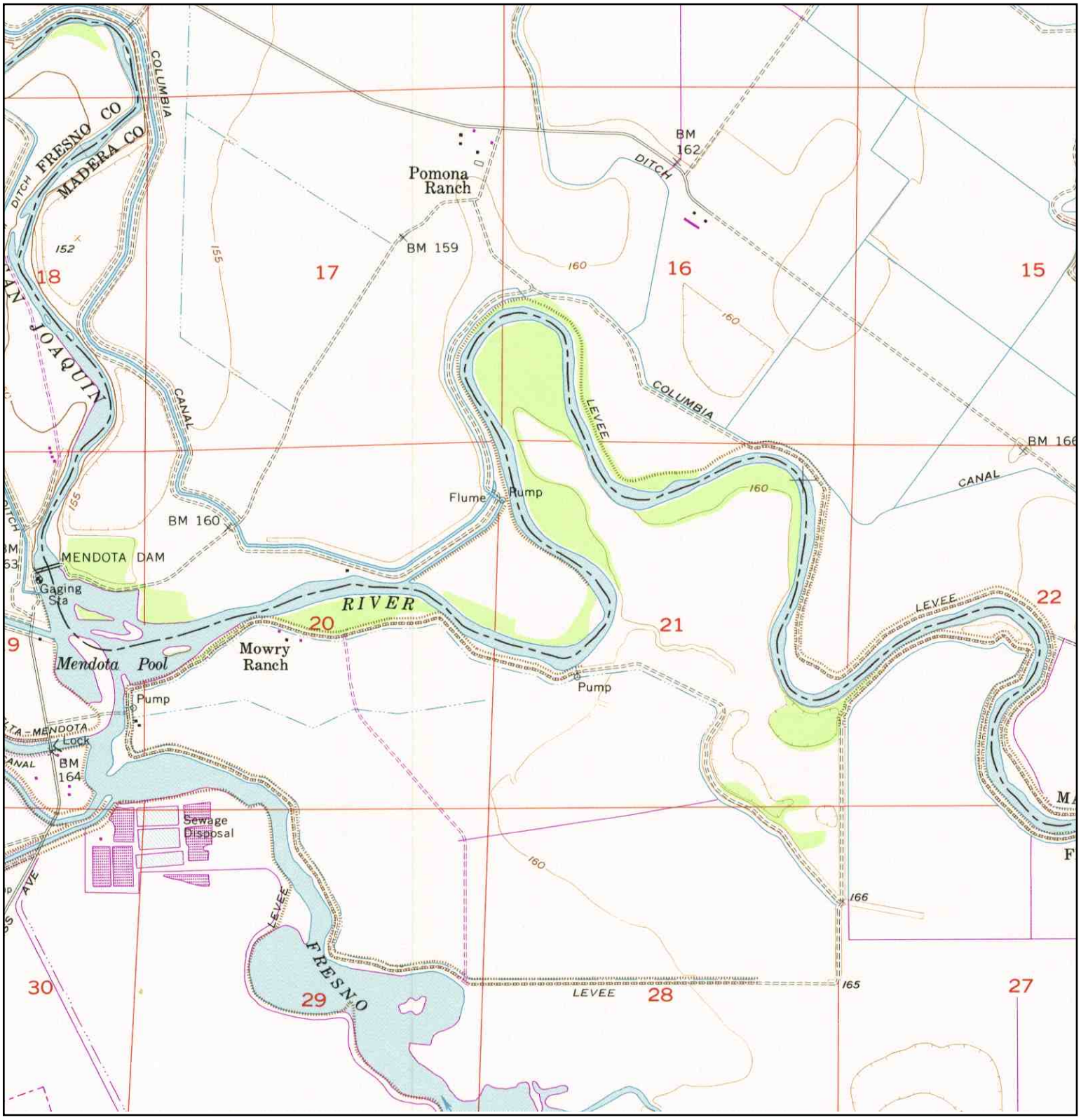

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	MAP YEAR:	1984	ADDRESS:	San Joaquin River Restoration Project Alternatives	CONTACT:	Joe Morgan
	PHOTOREVISED:	1956		Mendota, CA 93640	INQUIRY#:	3196001.2
	SERIES:	7.5	LAT/LONG:	36.7737 / -120.3304	RESEARCH DATE:	10/31/2011
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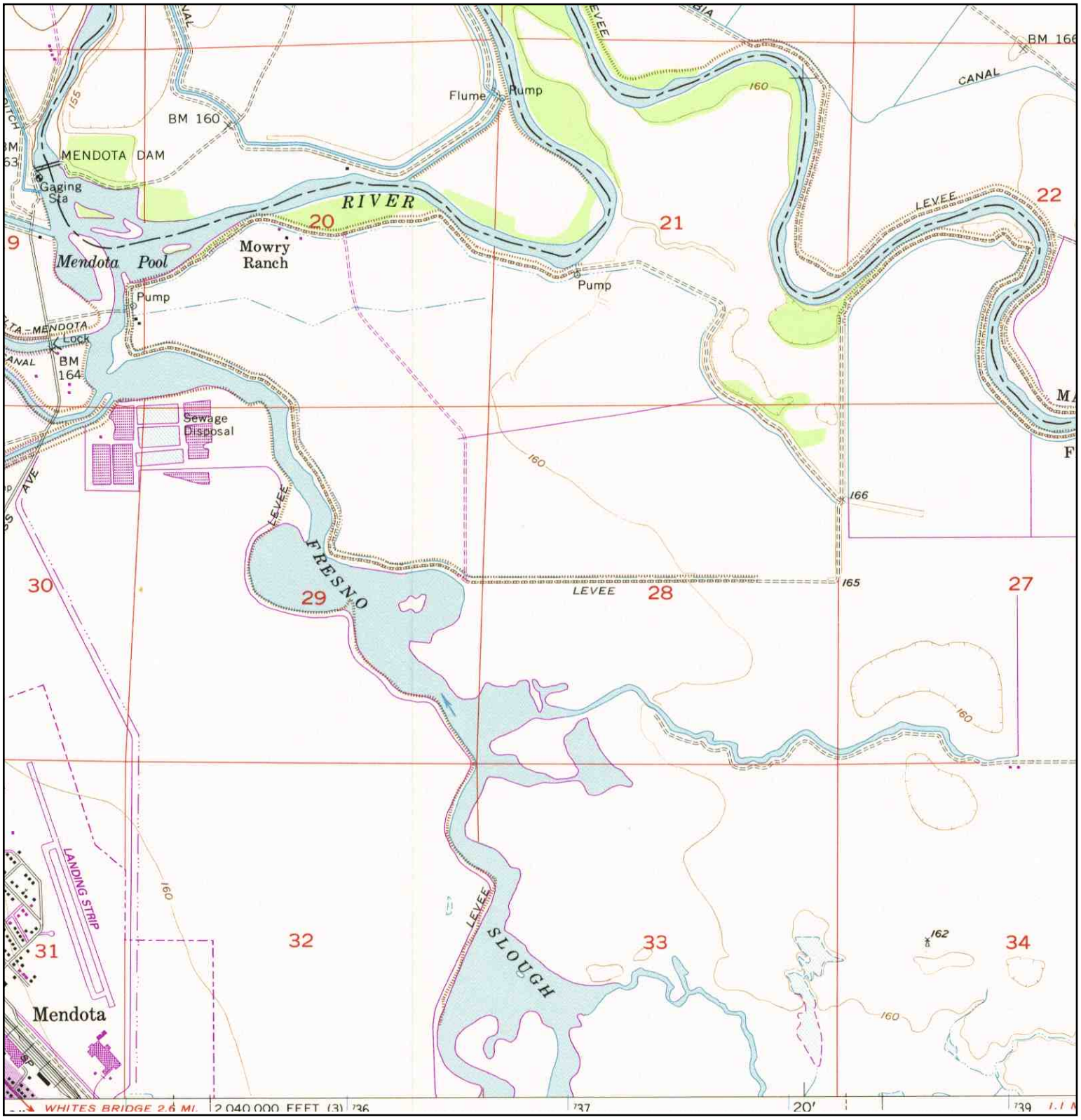
Historical Topographic Map



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	MAP YEAR:	1984	ADDRESS:	San Joaquin River Restoration Project Alternatives	CONTACT: Joe Morgan
	PHOTOREVISED:	1956		Mendota, CA 93640	INQUIRY#: 3196001.2
	SERIES:	7.5	LAT/LONG:	36.7737 / -120.3304	RESEARCH DATE: 10/31/2011
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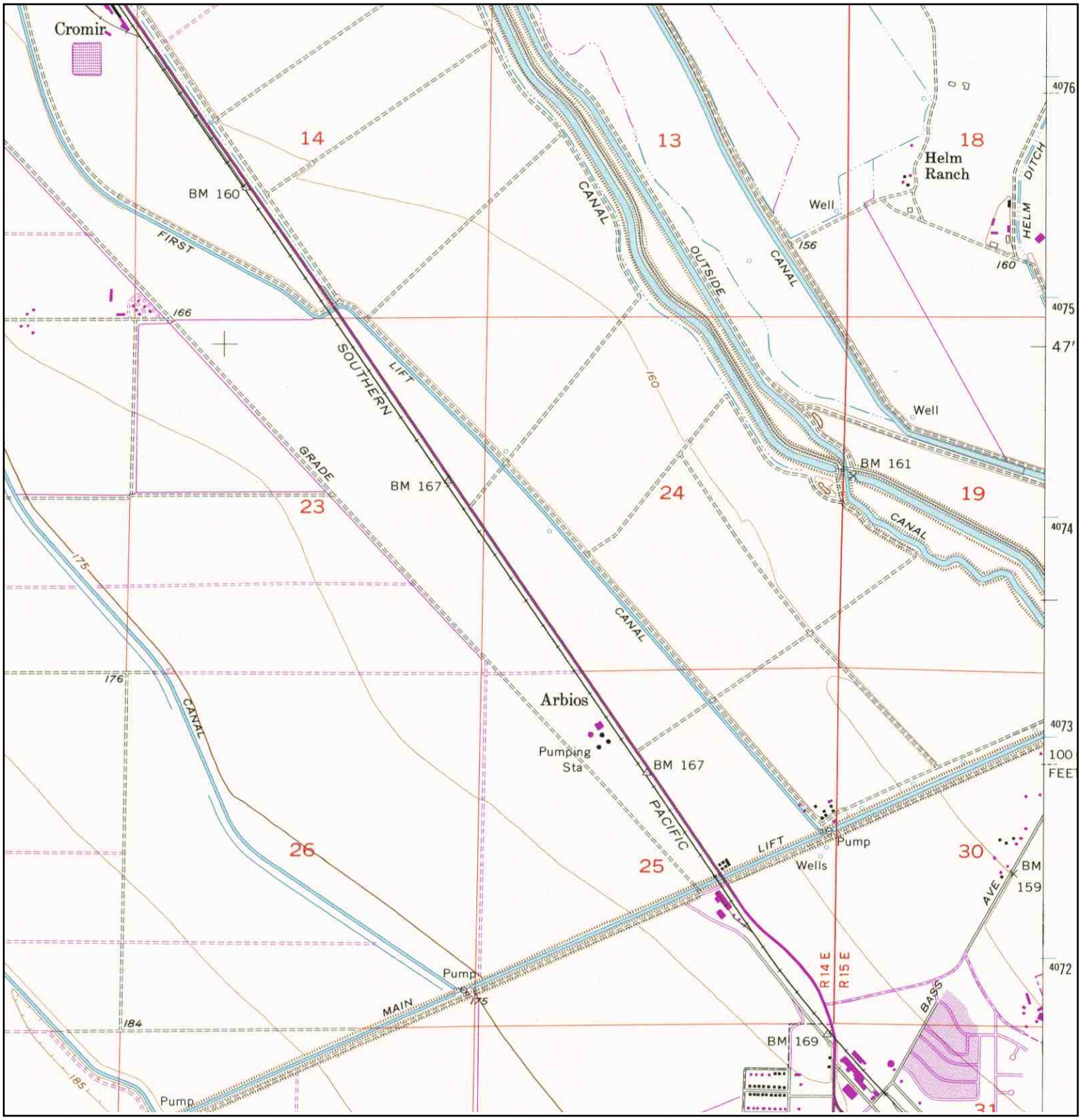

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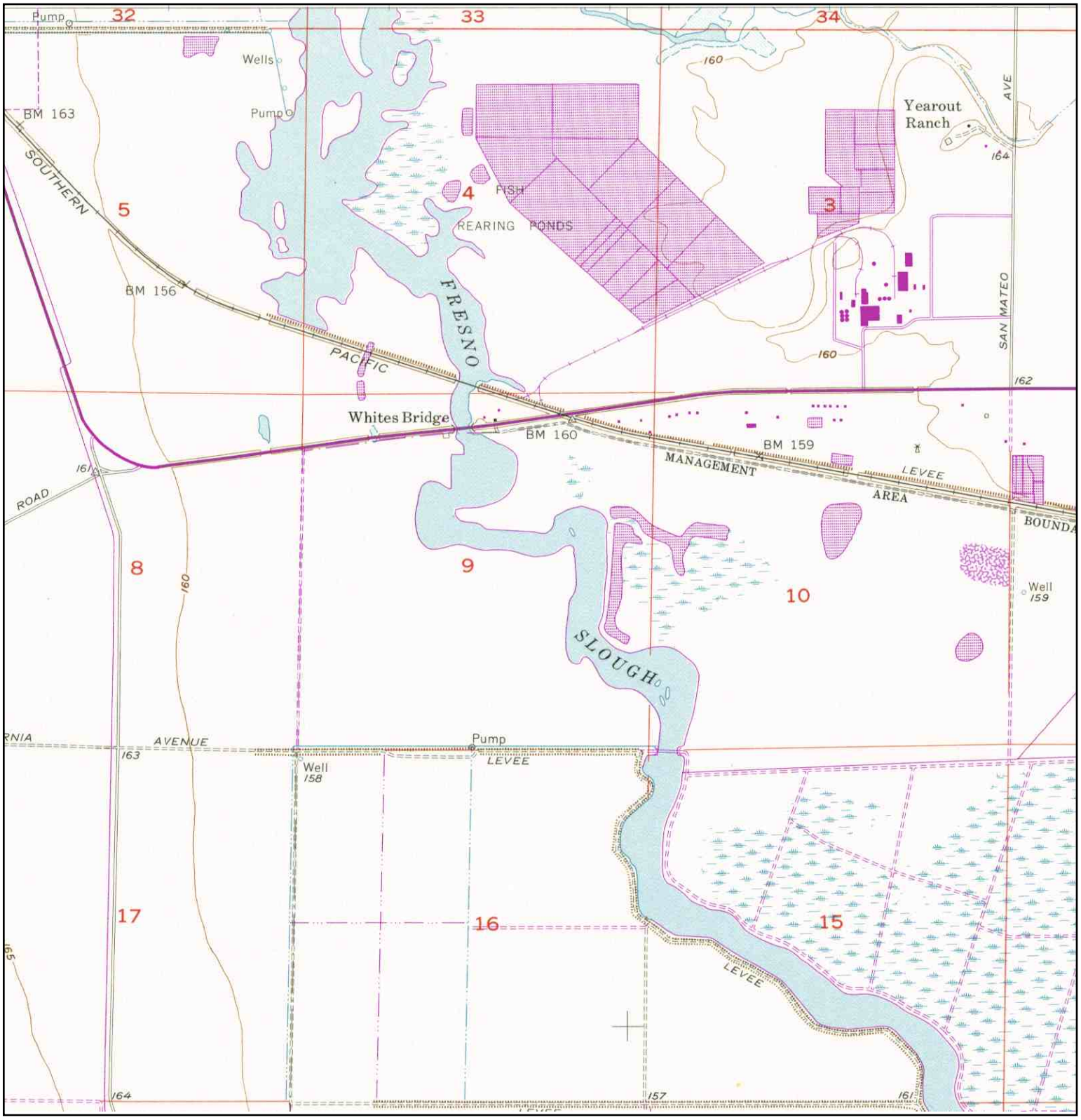

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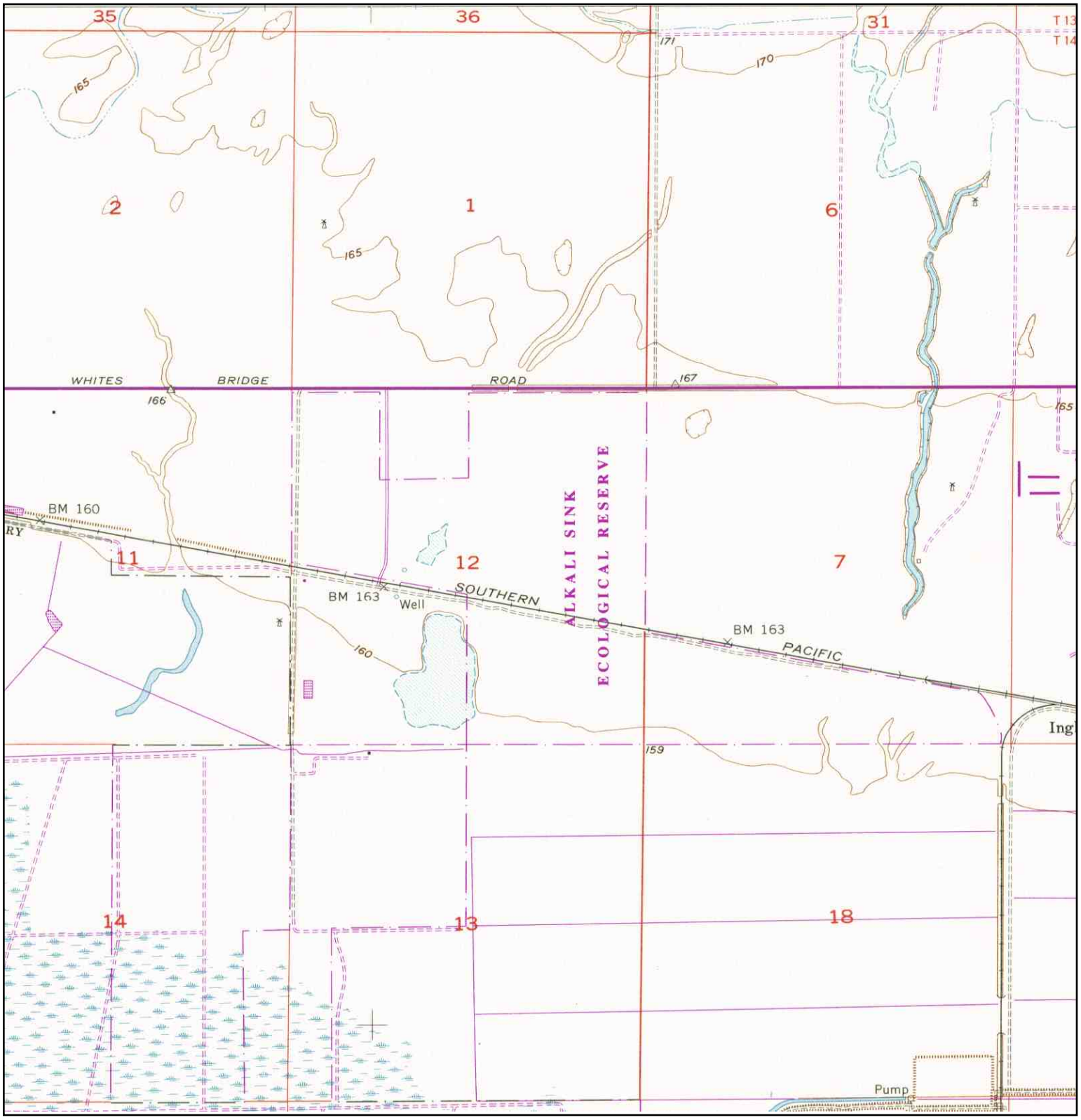

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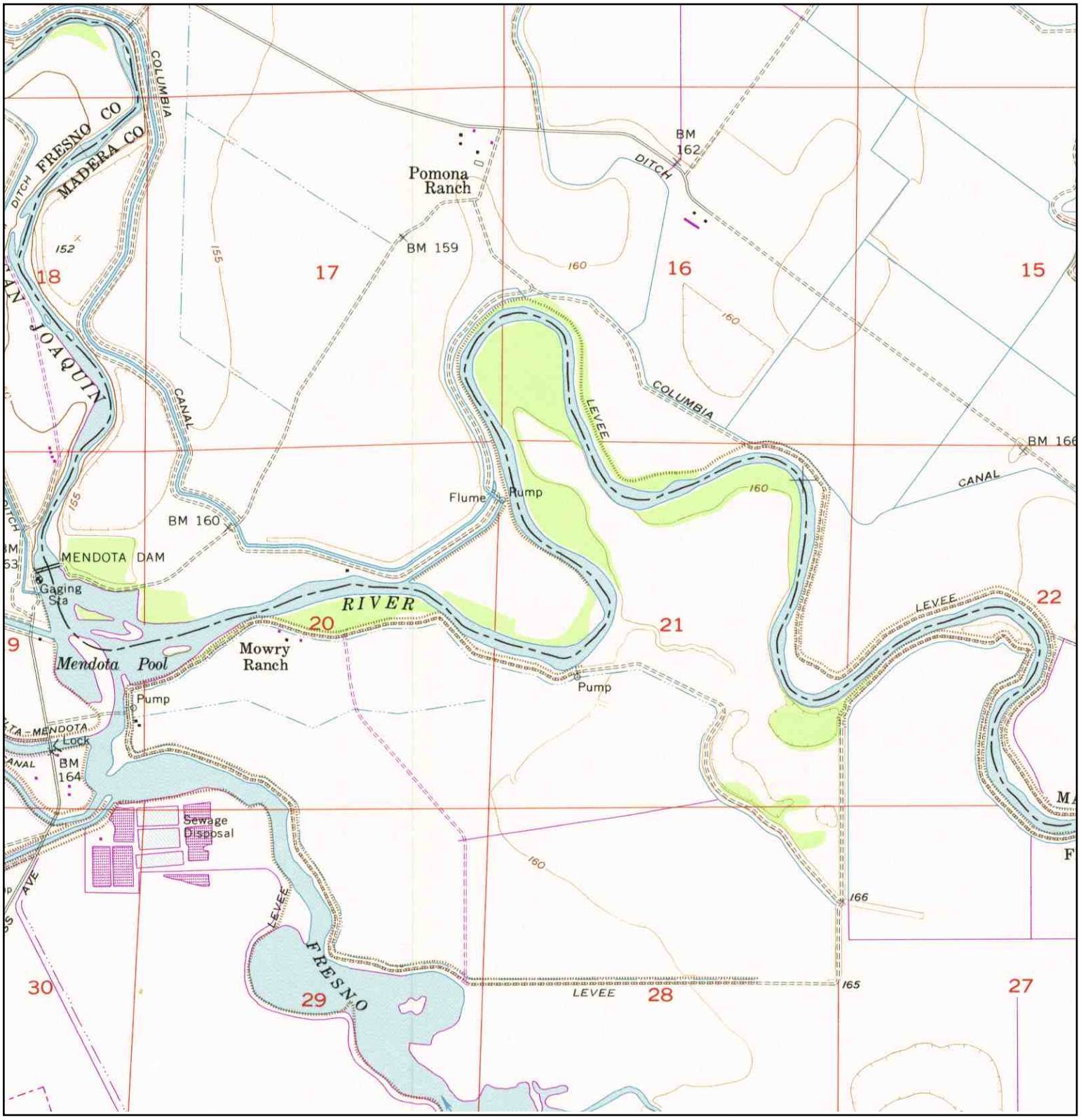

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	MAP YEAR:	1984	ADDRESS:	San Joaquin River Restoration Project Alternatives	CONTACT:	Joe Morgan
	PHOTOREVISED:	1956		Mendota, CA 93640	INQUIRY#:	3196001.2
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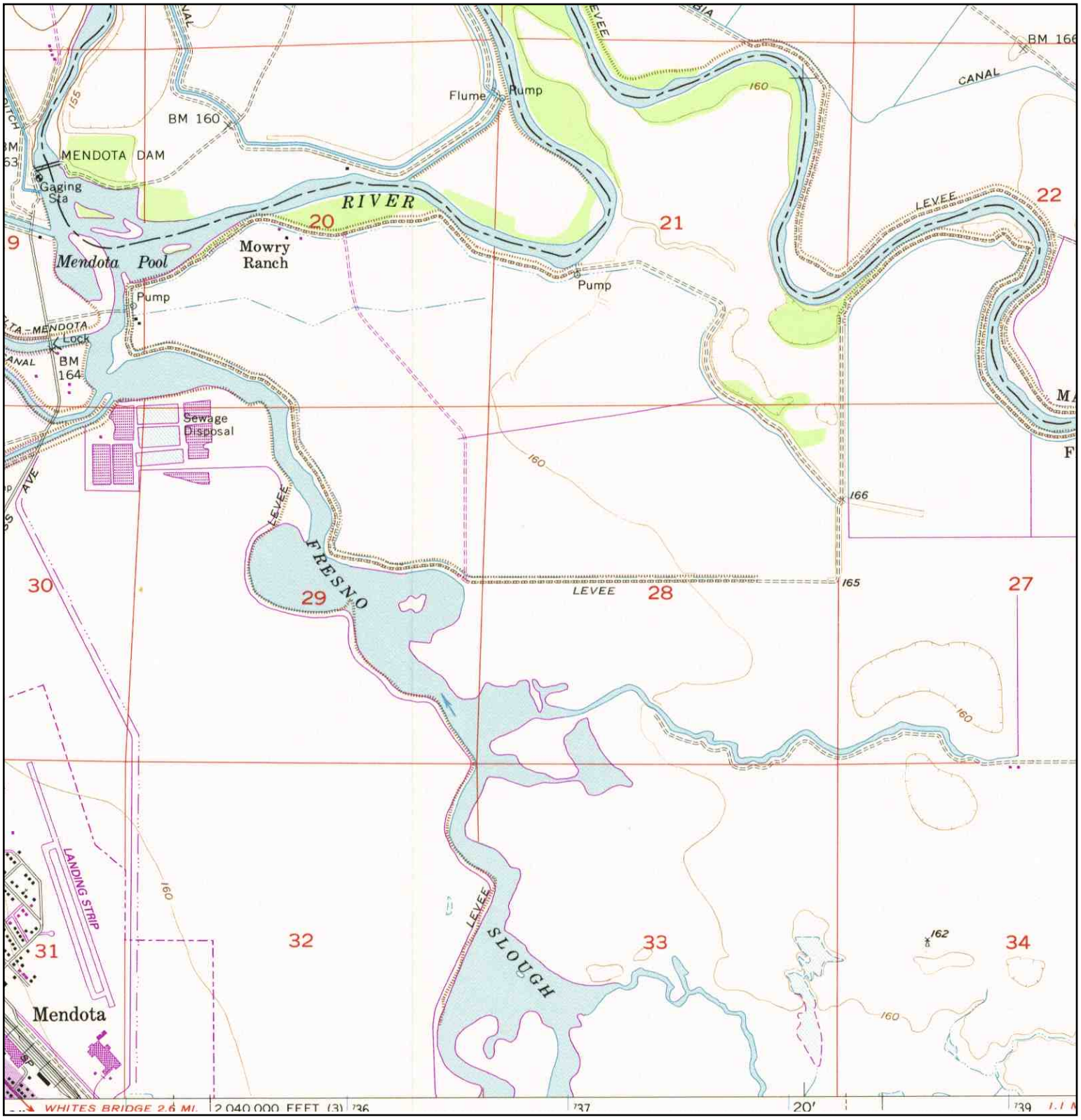
Historical Topographic Map



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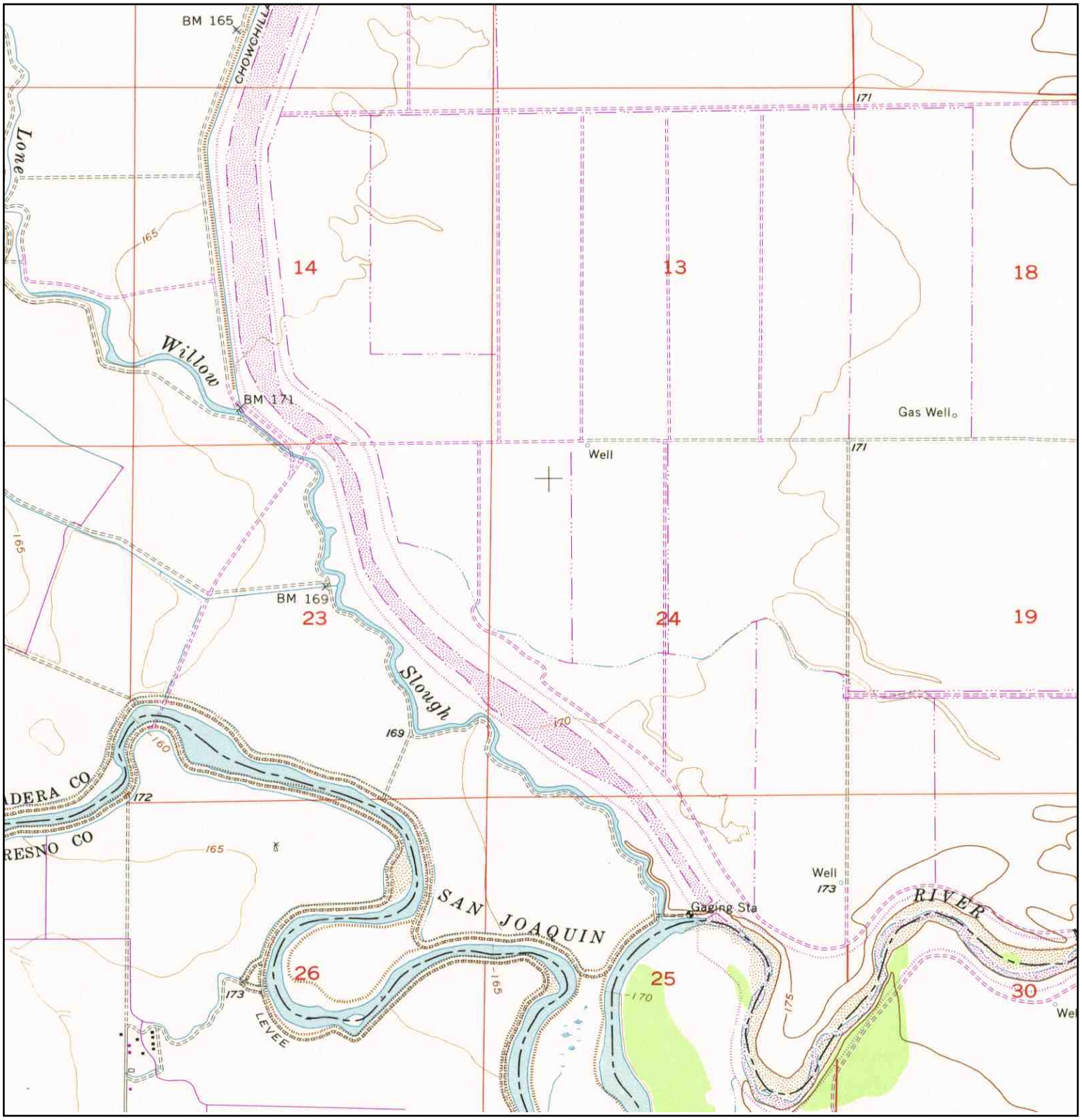

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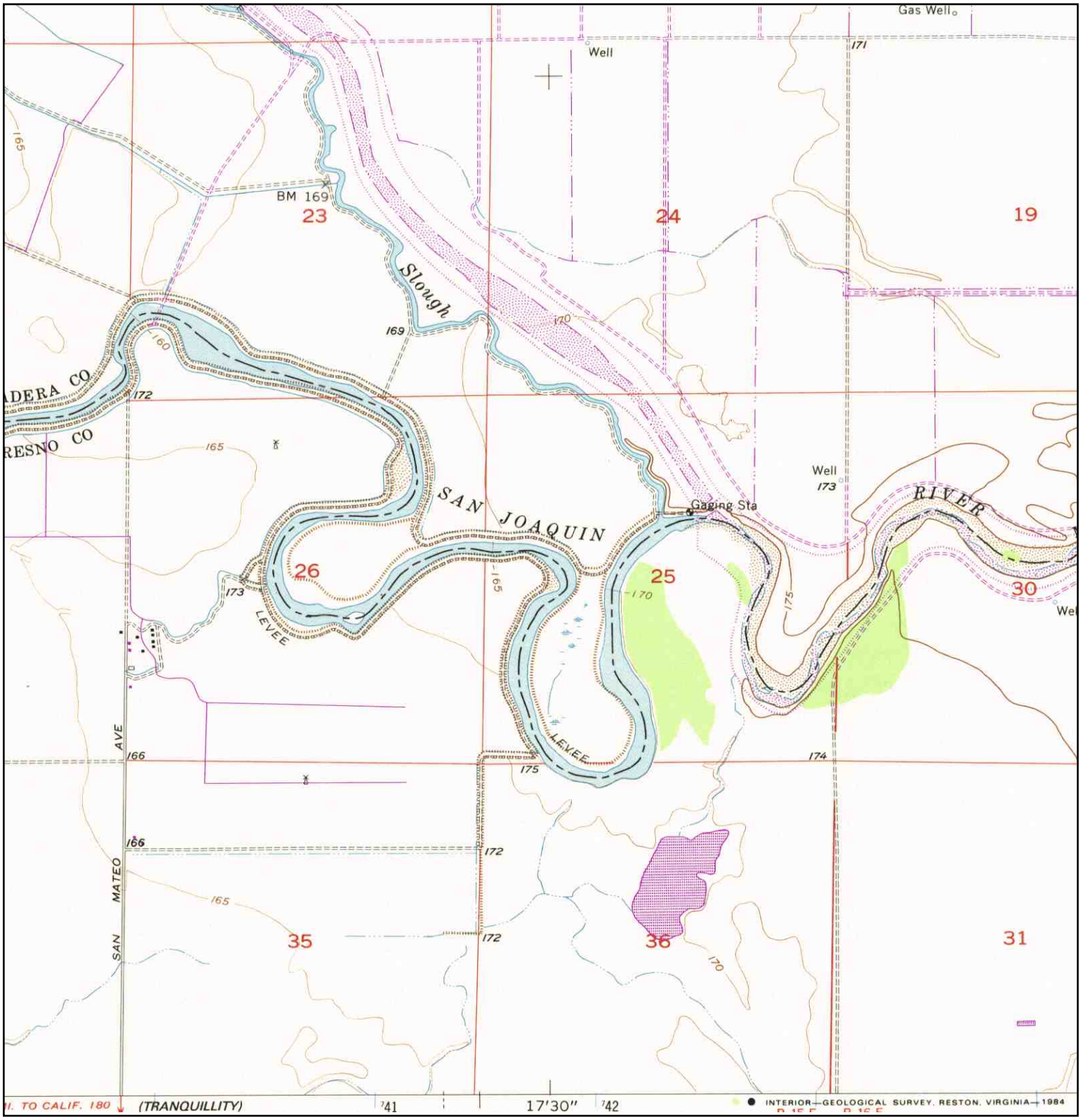
Historical Topographic Map



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San Joaquin River Restoration Project Alternatives

San Joaquin River Restoration Project Alternatives

Mendota, CA 93640

Inquiry Number: 3217246.1

December 01, 2011

Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

12/01/11

Site Name:
San Joaquin River Restoration
San Joaquin River Restoration
Mendota, CA 93640

Client Name:
URS Corporation
1333 Broadway
Oakland, CA 94612

EDR Inquiry # 3217246.1

Contact: April Giangerelli

EDR® Environmental Data Resources Inc

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Certified Sanborn Results:

Site Name: San Joaquin River Restoration Project
Address: San Joaquin River Restoration Project
City, State, Zip: Mendota, CA 93640
Cross Street:
P.O. # NA
Project: 186000200.00310
Certification # 0037-4FF8-8F49

Sanborn® Library search results
Certification # 0037-4FF8-8F49

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

The Sanborn Library includes more than 1.2 million Sanborn fire insurance maps, which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

The Sanborn Library LLC Since 1866™

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Attachment C

Well Search Report

San Joaquin River Restoration Project Alternatives
Mendota, CA 93640

Inquiry Number: 3196001.1w
December 01, 2011

EDR DataMap™ Well Search Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

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Please contact EDR at 1-800-352-0050
with any questions or comments.

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GEOCHECK VERSION 2.1
SUMMARY

FEDERAL DATABASE WELL INFORMATION

MAP ID	WELL ID
1	USGS3202138
1	USGS3202136
2	USGS3202131
3	USGS3202130
4	USGS3202122
6	USGS3202106
7	USGS3202065
9	USGS3202239
10	USGS3202238
11	USGS3202237
13	USGS3202232
12	USGS3202231
14	USGS3202212
15	USGS3202208
16	USGS3202207
16	USGS3202206
18	USGS3202197
18	USGS3202198
17	USGS3202195
18	USGS3202194
19	USGS3202190
21	USGS3202186
22	USGS3202184
22	USGS3202171
23	USGS3202328
24	USGS3202325
25	USGS3202324
26	USGS3202316
27	USGS3202312
29	USGS3202310
30	USGS3202308
31	USGS3202307
32	USGS3202305
33	USGS3202304
35	USGS3202298
36	USGS3202297
37	USGS3202295
38	USGS3202291
39	USGS3202289
41	USGS3202284
42	USGS3202283
45	USGS3202280
47	USGS3202279
47	USGS3202276
47	USGS3202275

GEOCHECK VERSION 2.1
SUMMARY

FEDERAL DATABASE WELL INFORMATION

MAP ID	WELL ID
47	USGS3202274
50	USGS3202417
51	USGS3202406
51	USGS3202405
51	USGS3202400
54	USGS3202399
51	USGS3202395
51	USGS3202397
51	USGS3202396
51	USGS3202398
51	USGS3202393
51	USGS3202392
57	USGS3202391
56	USGS3202388
58	USGS3202387
51	USGS3202385
51	USGS3202386
51	USGS3202384
59	USGS3202383
60	USGS3202381
60	USGS3202380
61	USGS3202378
57	USGS3202377
62	USGS3202376
64	USGS3202372
64	USGS3202373
65	USGS3202368
66	USGS3202365
67	USGS3202360
66	USGS3202353
66	USGS3202352
71	USGS3202351
68	USGS3202361
70	USGS3202350
78	USGS3202343
77	USGS3202342
81	USGS3202484
82	USGS3202481
83	USGS3202479
83	USGS3202478
84	USGS3202475
84	USGS3202477
84	USGS3202476
83	USGS3202474
85	USGS3202471
85	USGS3202470

GEOCHECK VERSION 2.1
SUMMARY

FEDERAL DATABASE WELL INFORMATION

MAP ID	WELL ID
86	USGS3202463
87	USGS3202461
88	USGS3202460
87	USGS3202458
90	USGS3202457
90	USGS3202456
87	USGS3202450
87	USGS3202451
87	USGS3202453
87	USGS3202445
87	USGS3202452
87	USGS3202447
87	USGS3202454
87	USGS3202444
87	USGS3202449
87	USGS3202446
87	USGS3202448
91	USGS3202442
87	USGS3202441
87	USGS3202438
92	USGS3202435
94	USGS3202434
95	USGS3202431
97	USGS3202425
94	USGS3202597
98	USGS3202584
100	USGS3202549
99	USGS3202548
102	USGS3202541
99	USGS3202540
99	USGS3202536
99	USGS3202533
104	USGS3202530
105	USGS3202520

STATE WATER WELL INFORMATION

MAP ID	WELL ID
5	CADW40000033126
5	CADW40000033127
8	CADW40000033061
8	CADW40000033062
12	CADW40000033050
15	CADW40000033015
16	CADW40000033013
17	CADW40000033009
20	CADW40000033000
20	CADW40000032994
22	CADW40000032972
23	CADW40000032949
24	CADW40000032944
28	CADW40000032935
28	CADW40000032934

GEOCHECK VERSION 2.1
SUMMARY

STATE WATER WELL INFORMATION

MAP ID	WELL ID
34	CADW40000032918
40	CADW40000032911
43	CADW40000032903
44	CADW40000032894
46	CADW40000032889
48	CADW40000032885
47	CADW40000032883
49	CADW40000032880
47	CADW40000032877
51	CADW40000032817
52	CADW40000032816
53	CADW40000032815
51	CADW40000032814
55	CADW40000032810
55	CADW40000032811
51	1010021
56	CADW40000032805
51	1010021
57	CADW40000032800
59	CADW40000032798
61	CADW40000032797
62	CADW40000032794
63	CADW40000032793
65	CADW40000032788
67	CADW40000032778
68	CADW40000032773
69	CADW40000032764
68	CADW40000032763
70	CADW40000032760
72	CADW40000032758
73	CADW40000032755
74	CADW40000032740
75	CADW40000032737
76	1010021
76	1010021
77	CADW40000032732
78	CADW40000032728
78	CADW40000032716
79	CADW40000032708
79	CADW40000032697
79	CADW40000032687
80	CADW40000032677
80	CADW40000032678
80	CADW40000032675
80	CADW40000032676
83	CADW40000032667
83	CADW40000032666
83	CADW40000032664
83	CADW40000032665
83	CADW40000032663
83	CADW40000032661
89	CADW40000032629
88	CADW40000032628
86	CADW40000032626

GEOCHECK VERSION 2.1
SUMMARY

STATE WATER WELL INFORMATION

MAP ID	WELL ID
86	CADW40000032627
90	CADW40000032625
90	CADW40000032624
93	CADW40000032613
93	CADW40000032614
94	CADW40000032605
94	CADW40000032604
99	CADW40000032539
101	CADW40000032530
101	CADW40000032529
99	CADW40000032521
99	CADW40000032520
99	CADW40000032518
103	CADW40000032513
99	CADW40000032509
103	CADW40000032505

STATE OIL/GAS WELL INFORMATION

MAP ID	WELL ID
1	CAOG70000193193
2	CAOG70000193190
3	CAOG70000193171
4	CAOG70000193168
5	CAOG70000193159
6	CAOG70000193157
7	CAOG70000193152
8	CAOG70000193134

PUBLIC WATER SUPPLY SYSTEM INFORMATION

Map ID: 96
PWS ID: CA1000101
PWS Name: CALIF DEPT OF FISH & GAME
CALIF DEPT OF FISH & GAME
SANTA FE GRADE
MENDOTA, CA 93640

PWS currently has or had major violation(s) or enforcement:

USGS TOPOGRAPHIC MAP(S)

36120-F3 TRANQUILLITY, CA
36120-F4 COIT RANCH, CA
36120-G3 MENDOTA DAM, CA
36120-G4 FIREBAUGH, CA

AREA RADON INFORMATION

GEOCHECK VERSION 2.1
SUMMARY

AREA RADON INFORMATION

Federal Area Radon Information for Zip Code: 93640

Number of sites tested: 1

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	Not Reported	Not Reported	Not Reported	Not Reported
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	0.400 pCi/L	100%	0%	0%

Federal Area Radon Information for Zip Code: 93630

Number of sites tested: 1

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.900 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	0.000 pCi/L	100%	0%	0%

Federal EPA Radon Zone for MADERA County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for MADERA COUNTY, CA

Number of sites tested: 20

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	1.405 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	8.600 pCi/L	75%	0%	25%

Federal EPA Radon Zone for FRESNO County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for FRESNO COUNTY, CA

Number of sites tested: 100

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	1.251 pCi/L	98%	2%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	1.433 pCi/L	100%	0%	0%

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Water Well Information:

Map ID:	1		
Agency cd:	USGS	Site no:	364905120204801
Site name:	013S015E09E001M		
Latitude:	364905	EDR Site id:	USGS3202138
Longitude:	1202048	Dec lat:	36.81800432
Dec lon:	-120.34766927	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SWSWNWS09 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19500809
Date inventoried:	19561219	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	308	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	1		
Agency cd:	USGS	Site no:	364901120204701
Site name:	013S015E09E002M		
Latitude:	364901	EDR Site id:	USGS3202136
Longitude:	1202047	Dec lat:	36.81689322
Dec lon:	-120.34739145	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000

Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19640101
Date inventoried:	19650806	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	308	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1965-11-01	Ground water data end date:	1965-11-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1965-11-01	25.00	

Map ID:	2		
Agency cd:	USGS	Site no:	364855120212201
Site name:	013S015E07G001M		
Latitude:	364855	EDR Site id:	USGS3202131
Longitude:	1202122	Dec lat:	36.81522664
Dec lon:	-120.35711393	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SESWNES07 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	155.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19561219	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported

Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	3		
Agency cd:	USGS	Site no:	364855120200201
Site name:	013S015E09H001M		
Latitude:	364855	EDR Site id:	USGS3202130
Longitude:	1202002	Dec lat:	36.81522651
Dec lon:	-120.33489101	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SWSENES09 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19500902
Date inventoried:	19561219	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	328	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	4		
Agency cd:	USGS	Site no:	364849120224501
Site name:	013S015E07L001M		
Latitude:	364849	EDR Site id:	USGS3202122
Longitude:	1202245	Dec lat:	36.81356012
Dec lon:	-120.38017015	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NWNESWS07 T13S R15E M
Location map:	FIREBAUGH	Map scale:	24000

Altitude:	155.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19530201
Date inventoried:	19561129	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	ALLUVIUM ABOVE E-CLAY		
Well depth:	265	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1968-07-15
Water quality data end date:	1968-07-15	Water quality data count:	1
Ground water data begin date:	1960-05-01	Ground water data end date:	1960-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05-01	27.00	

Map ID:	6		
Agency cd:	USGS	Site no:	364831120204601
Site name:	013S015E09M001M		
Latitude:	364831	EDR Site id:	USGS3202106
Longitude:	1202046	Dec lat:	36.80856002
Dec lon:	-120.34711342	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SWNWSWS09 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19560101
Date inventoried:	19561219	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	263	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported

Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	7		
Agency cd:	USGS	Site no:	364824120223101
Site name:	013S015E18B001M		
Latitude:	364824	EDR Site id:	USGS3202065
Longitude:	1202231	Dec lat:	36.80661577
Dec lon:	-120.37628094	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NWNWNES18 T13S R15E M
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	157.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19561129	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1960-05-01	Ground water data end date:	1960-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05-01	22.00	

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	9		
Agency cd:	USGS	Site no:	364819120203401
Site name:	013S015E16D001M		
Latitude:	364819	EDR Site id:	USGS3202239
Longitude:	1202034	Dec lat:	36.80522672
Dec lon:	-120.34377989	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	NWNWNWS16 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	164.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19390801
Date inventoried:	19561211	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	290	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1965-02-01	Ground water data end date:	1965-02-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1965-02-01	21.00	

Map ID:	10		
Agency cd:	USGS	Site no:	364816120202201
Site name:	013S015E16B001M		
Latitude:	364816	EDR Site id:	USGS3202238
Longitude:	1202022	Dec lat:	36.80439338
Dec lon:	-120.34044642	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SWNWNES16 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19480311
Date inventoried:	19561219	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	330	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	11		
Agency cd:	USGS	Site no:	364814120210101
Site name:	013S015E17A001M		
Latitude:	364814	EDR Site id:	USGS3202237
Longitude:	1202101	Dec lat:	36.80383789
Dec lon:	-120.35128008	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19620903	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1962-09-01	Ground water data end date:	1962-09-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1962-09-01	14.00	

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	13		
Agency cd:	USGS	Site no:	364811120222801
Site name:	013S015E18G001M		
Latitude:	364811	EDR Site id:	USGS3202232
Longitude:	1202228	Dec lat:	36.80300471
Dec lon:	-120.37544747	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	SESWNES18 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	155.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19541127
Date inventoried:	19561129	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	ALLUVIUM ABOVE E-CLAY		
Well depth:	330	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1968-07-17
Water quality data end date:	1979-08-14	Water quality data count:	2
Ground water data begin date:	1960-05-01	Ground water data end date:	1960-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05-01	25.00	

Map ID:	12		
Agency cd:	USGS	Site no:	364810120183401
Site name:	013S015E14E001M		
Latitude:	364810	EDR Site id:	USGS3202231
Longitude:	1201834	Dec lat:	36.80272656
Dec lon:	-120.31044544	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SWSWNWS14 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19480515
Date inventoried:	19560906	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	283	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1964-08-01	Ground water data end date:	1964-08-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1964-08-01	64.00	

Map ID:	14		
Agency cd:	USGS	Site no:	364800120191001
Site name:	013S015E15G001M		
Latitude:	364800	EDR Site id:	USGS3202212
Longitude:	1201910	Dec lat:	36.79994889
Dec lon:	-120.32044568	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SWSWNES15 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19480801
Date inventoried:	19560801	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	384	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	15		
Agency cd:	USGS	Site no:	364757120183301
Site name:	013S015E14M001M		
Latitude:	364757	EDR Site id:	USGS3202208
Longitude:	1201833	Dec lat:	36.7991155
Dec lon:	-120.31016755	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19491001
Date inventoried:	19560906	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	300	Hole depth:	304
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	16		
Agency cd:	USGS	Site no:	364754120225702
Site name:	013S015E18M002M		
Latitude:	364754	EDR Site id:	USGS3202207
Longitude:	1202257	Dec lat:	36.79828261
Dec lon:	-120.38350314	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	155.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	100	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	16		
Agency cd:	USGS	Site no:	364754120225701
Site name:	013S015E18M001M		
Latitude:	364754	EDR Site id:	USGS3202206
Longitude:	1202257	Dec lat:	36.79828261
Dec lon:	-120.38350314	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	155.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	1949
Date inventoried:	19680610	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	152	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	18		
Agency cd:	USGS	Site no:	364747120223401
Site name:	013S015E18Q001M		
Latitude:	364747	EDR Site id:	USGS3202197
Longitude:	1202234	Dec lat:	36.79633816
Dec lon:	-120.37711399	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NWSWSES18 T13S R15E N
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19610501	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	18		
Agency cd:	USGS	Site no:	364747120223402
Site name:	013S015E18Q002M		
Latitude:	364747	EDR Site id:	USGS3202198
Longitude:	1202234	Dec lat:	36.79633816
Dec lon:	-120.37711399	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NWSWSES 18T 13S R 15E
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Upper Tuolumne. California. Area = 1600 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19760316
Date inventoried:	19850129	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	ALLUVIUM ABOVE E-CLAY		
Well depth:	220	Hole depth:	225
Source of depth data:	driller		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1985-05-13
Water quality data end date:	1985-05-13	Water quality data count:	1
Ground water data begin date:	0000-00-00	Ground water data end date:	0000-00-00
Ground water data count:	0		

Ground-water levels, Number of Measurements: 0

Map ID:	17		
Agency cd:	USGS	Site no:	364745120220501
Site name:	013S015E18R001M		
Latitude:	364745	EDR Site id:	USGS3202195
Longitude:	1202205	Dec lat:	36.79578257
Dec lon:	-120.36905817	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	157.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19641023	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	94.0	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1964-10-01	Ground water data end date:	1964-10-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1964-10-01	18.00	

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	18		
Agency cd:	USGS	Site no:	364744120223401
Site name:	013S015E18P001M		
Latitude:	364744	EDR Site id:	USGS3202194
Longitude:	1202234	Dec lat:	36.79550484
Dec lon:	-120.37711397	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NESESWS18 T13S R15E M
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19680610	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	19		
Agency cd:	USGS	Site no:	364740120201401
Site name:	013S015E16Q001M		
Latitude:	364740	EDR Site id:	USGS3202190
Longitude:	1202014	Dec lat:	36.79439352
Dec lon:	-120.33822384	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SESWSES16 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	1960
Date inventoried:	19650806	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	260	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1965-11-01	Ground water data end date:	1965-11-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1965-11-01	27.00	

Map ID:	21		
Agency cd:	USGS	Site no:	364737120181701
Site name:	013S015E14P001M		
Latitude:	364737	EDR Site id:	USGS3202186
Longitude:	1201817	Dec lat:	36.79356001
Dec lon:	-120.30572281	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SESWSES14 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	170.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19480507
Date inventoried:	19560806	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	ALLUVIUM ABOVE E-CLAY		
Well depth:	279	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1965-06-07
Water quality data end date:	1965-06-07	Water quality data count:	1
Ground water data begin date:	0000-00-00	Ground water data end date:	0000-00-00
Ground water data count:	0		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	22		
Agency cd:	USGS	Site no:	364736120172401
Site name:	013S015E13N001M		
Latitude:	364736	EDR Site id:	USGS3202184
Longitude:	1201724	Dec lat:	36.79328215
Dec lon:	-120.29100013	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	168.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19640918	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	0000-00-00	Ground water data end date:	0000-00-00
Ground water data count:	0		

Ground-water levels, Number of Measurements: 0

Map ID:	22		
Agency cd:	USGS	Site no:	364735120172301
Site name:	013S015E24D001M		
Latitude:	364735	EDR Site id:	USGS3202171
Longitude:	1201723	Dec lat:	36.79300437
Dec lon:	-120.29072233	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	NWNWNWS24 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	168.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19561212	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	204	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	23		
Agency cd:	USGS	Site no:	364727120232101
Site name:	013S014E24B001M		
Latitude:	364727	EDR Site id:	USGS3202328
Longitude:	1202321	Dec lat:	36.79078277
Dec lon:	-120.39016979	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	159.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19641001
Date inventoried:	19680611	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	234	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	24		
Agency cd:	USGS	Site no:	364723120214501
Site name:	013S015E20D001M		
Latitude:	364723	EDR Site id:	USGS3202325
Longitude:	1202145	Dec lat:	36.78967152
Dec lon:	-120.36350226	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SENWNWS20 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19530401
Date inventoried:	19561211	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	252	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	25		
Agency cd:	USGS	Site no:	364723120203201
Site name:	013S015E16L001M		
Latitude:	364723	EDR Site id:	USGS3202324
Longitude:	1202032	Dec lat:	36.7896714
Dec lon:	-120.34322386	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SENESWS16 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	1946
Date inventoried:	19561211	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	225	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	26		
Agency cd:	USGS	Site no:	364720120225401
Site name:	013S015E19E001M		
Latitude:	364720	EDR Site id:	USGS3202316
Longitude:	1202254	Dec lat:	36.78883832
Dec lon:	-120.3826695	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	155.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19590510	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	ALLUVIUM ABOVE E-CLAY		
Well depth:	350	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1968-07-15
Water quality data end date:	1968-07-15	Water quality data count:	1
Ground water data begin date:	1961-05-01	Ground water data end date:	1961-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1961-05-01	36.00	

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	27		
Agency cd:	USGS	Site no:	364718120172701
Site name:	013S015E24E001M		
Latitude:	364718	EDR Site id:	USGS3202312
Longitude:	1201727	Dec lat:	36.78828222
Dec lon:	-120.29183335	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	Not Reported		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5		
Altitude datum:	Not Reported		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19620913	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	5530	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	29		
Agency cd:	USGS	Site no:	364717120184301
Site name:	013S015E23E001M		
Latitude:	364717	EDR Site id:	USGS3202310
Longitude:	1201843	Dec lat:	36.78800458
Dec lon:	-120.3129451	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19560406
Date inventoried:	19620903	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	250	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	30		
Agency cd:	USGS	Site no:	364716120223301
Site name:	013S015E19B001M		
Latitude:	364716	EDR Site id:	USGS3202308
Longitude:	1202233	Dec lat:	36.78772719
Dec lon:	-120.37683595	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	163.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1960-05-01	Ground water data end date:	1960-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05-01	15.00	

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	31		
Agency cd:	USGS	Site no:	364715120195701
Site name:	013S015E21H001M		
Latitude:	364715	EDR Site id:	USGS3202307
Longitude:	1201957	Dec lat:	36.78744915
Dec lon:	-120.33350127	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19640107
Date inventoried:	19650806	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	306	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1965-11-01	Ground water data end date:	1965-11-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1965-11-01	30.00	

Map ID:	32		
Agency cd:	USGS	Site no:	364712120203001
Site name:	013S015E20L001M		
Latitude:	364712	EDR Site id:	USGS3202305
Longitude:	1202030	Dec lat:	36.78661589
Dec lon:	-120.3426682	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	S20 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	52		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19620906	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	25.0	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1963-10-01	Ground water data end date:	1963-10-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1963-10-01	9.10	

Map ID:	33		
Agency cd:	USGS	Site no:	364712120192501
Site name:	013S015E15P001M		
Latitude:	364712	EDR Site id:	USGS3202304
Longitude:	1201925	Dec lat:	36.78661578
Dec lon:	-120.32461209	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	NESESWS15 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19530213
Date inventoried:	19561219	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	300	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	35		
Agency cd:	USGS	Site no:	364706120223801
Site name:	013S015E19K003M		
Latitude:	364706	EDR Site id:	USGS3202298
Longitude:	1202238	Dec lat:	36.78494946
Dec lon:	-120.3782248	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	155.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19560616
Date inventoried:	19680611	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	132	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	36		
Agency cd:	USGS	Site no:	364705120180001
Site name:	013S015E23K001M		
Latitude:	364705	EDR Site id:	USGS3202297
Longitude:	1201800	Dec lat:	36.78467122
Dec lon:	-120.30100019	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SENWSES23 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	170.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19400415
Date inventoried:	19520911	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	121	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	37		
Agency cd:	USGS	Site no:	364704120221901
Site name:	013S015E19K002M		
Latitude:	364704	EDR Site id:	USGS3202295
Longitude:	1202219	Dec lat:	36.78439388
Dec lon:	-120.37294684	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	159.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	38.0	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	38		
Agency cd:	USGS	Site no:	364702120185601
Site name:	013S015E22J001M		
Latitude:	364702	EDR Site id:	USGS3202291
Longitude:	1201856	Dec lat:	36.783838
Dec lon:	-120.3165562	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	195603
Date inventoried:	19630407	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	250	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	39		
Agency cd:	USGS	Site no:	364701120223301
Site name:	013S015E19K001M		
Latitude:	364701	EDR Site id:	USGS3202289
Longitude:	1202233	Dec lat:	36.78356059
Dec lon:	-120.37683583	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	155.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	1951
Date inventoried:	Not Reported	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	200	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	41		
Agency cd:	USGS	Site no:	364657120231701
Site name:	013S014E24J001M		
Latitude:	364657	EDR Site id:	USGS3202284
Longitude:	1202317	Dec lat:	36.78244957
Dec lon:	-120.38905839	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	SWSENES24 T13S R14E M
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19510417
Date inventoried:	19510906	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	ALLUVIUM ABOVE E-CLAY		
Well depth:	246	Hole depth:	246
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1968-07-17
Water quality data end date:	1968-07-17	Water quality data count:	1
Ground water data begin date:	1952-05-01	Ground water data end date:	1952-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1952-05-01	29.00	

Map ID:	42		
Agency cd:	USGS	Site no:	364657120230901
Site name:	013S014E25J001M		
Latitude:	364657	EDR Site id:	USGS3202283
Longitude:	1202309	Dec lat:	36.78244955
Dec lon:	-120.3868361	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19510905	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	221	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1958-05-01	Ground water data end date:	1958-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1958-05-01	33.00	

Map ID:	45		
Agency cd:	USGS	Site no:	364652120201901
Site name:	013S015E21Q001M		
Latitude:	364652	EDR Site id:	USGS3202280
Longitude:	1202019	Dec lat:	36.7810604
Dec lon:	-120.33961239	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	SESWSES21 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19561127	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	0000-00-00	Ground water data end date:	0000-00-00
Ground water data count:	0		

Ground-water levels, Number of Measurements: 0

Map ID:	47		
Agency cd:	USGS	Site no:	364651120220901
Site name:	013S015E30A002M		
Latitude:	364651	EDR Site id:	USGS3202279
Longitude:	1202209	Dec lat:	36.78078281
Dec lon:	-120.37016888	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19480101
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	265	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	47		
Agency cd:	USGS	Site no:	364650120221601
Site name:	013S015E19R001M		
Latitude:	364650	EDR Site id:	USGS3202276
Longitude:	1202216	Dec lat:	36.78050505
Dec lon:	-120.37211337	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NWSESES19 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	155.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	1956
Date inventoried:	19680611	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	247	Hole depth:	Not Reported
Source of depth data:	reporting agency (generally USGS)		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1958-04-01	Ground water data end date:	1958-04-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1958-04-01	22.00	

Map ID:	47		
Agency cd:	USGS	Site no:	364649120222401
Site name:	013S015E19Q002M		
Latitude:	364649	EDR Site id:	USGS3202275
Longitude:	1202224	Dec lat:	36.78022729
Dec lon:	-120.37433565	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	079
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	157.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19790720
Date inventoried:	Not Reported	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	200	Hole depth:	210
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1979-07-20	Ground water data end date:	1979-07-20
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1979-07-20	20.00	

Map ID:	47		
Agency cd:	USGS	Site no:	364647120221901
Site name:	013S015E19Q001M		
Latitude:	364647	EDR Site id:	USGS3202274
Longitude:	1202219	Dec lat:	36.77967174
Dec lon:	-120.37294671	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19780817
Date inventoried:	19810120	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	213	Hole depth:	222
Source of depth data:	Not Reported		
Project number:	479435800		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1978-08-17	Ground water data end date:	1978-08-17
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1978-08-17	30.00	

Map ID:	50		
Agency cd:	USGS	Site no:	364640120220701
Site name:	013S015E30A001M		
Latitude:	364640	EDR Site id:	USGS3202417
Longitude:	1202207	Dec lat:	36.7777273
Dec lon:	-120.36961321	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19480118
Date inventoried:	19510905	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	265	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1962-09-01	Ground water data end date:	1962-09-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1962-09-01	41.00	

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	51		
Agency cd:	USGS	Site no:	364636120223601
Site name:	013S015E30B002M		
Latitude:	364636	EDR Site id:	USGS3202406
Longitude:	1202236	Dec lat:	36.77661626
Dec lon:	-120.37766898	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	161.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19480101
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	240	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1959-05-01	Ground water data end date:	1959-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1959-05-01	28.00	

Map ID:	51		
Agency cd:	USGS	Site no:	364636120222401
Site name:	013S015E30B006M		
Latitude:	364636	EDR Site id:	USGS3202405
Longitude:	1202224	Dec lat:	36.77661624
Dec lon:	-120.37433555	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NWNWNES30 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	163.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19650424
Date inventoried:	19680610	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	ALLUVIUM ABOVE E-CLAY		
Well depth:	240	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1968-07-17
Water quality data end date:	1968-07-17	Water quality data count:	1
Ground water data begin date:	0000-00-00	Ground water data end date:	0000-00-00
Ground water data count:	0		

Ground-water levels, Number of Measurements: 0

Map ID:	51		
Agency cd:	USGS	Site no:	364634120221901
Site name:	SUMP 013S015E30-1 M		
Latitude:	364634	EDR Site id:	USGS3202400
Longitude:	1202219	Dec lat:	36.77606068
Dec lon:	-120.3729466	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	162		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Collector or Ranney type well		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1984-05-10
Water quality data end date:	1984-05-10	Water quality data count:	1
Ground water data begin date:	0000-00-00	Ground water data end date:	0000-00-00
Ground water data count:	0		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	54		
Agency cd:	USGS	Site no:	364634120214001
Site name:	013S015E29C001M		
Latitude:	364634	EDR Site id:	USGS3202399
Longitude:	1202140	Dec lat:	36.77606062
Dec lon:	-120.36211293	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19711008
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	50.0	Hole depth:	50.0
Source of depth data:	driller		
Project number:	479435800		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	51		
Agency cd:	USGS	Site no:	364632120223401
Site name:	013S015E30B001M		
Latitude:	364632	EDR Site id:	USGS3202395
Longitude:	1202234	Dec lat:	36.77550516
Dec lon:	-120.37711338	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19490101
Date inventoried:	Not Reported	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	270	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	51		
Agency cd:	USGS	Site no:	364632120223403
Site name:	013S015E30B004M		
Latitude:	364632	EDR Site id:	USGS3202397
Longitude:	1202234	Dec lat:	36.77550516
Dec lon:	-120.37711338	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19640930
Date inventoried:	19680610	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	250	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	51		
Agency cd:	USGS	Site no:	364632120223402
Site name:	013S015E30B003M		
Latitude:	364632	EDR Site id:	USGS3202396
Longitude:	1202234	Dec lat:	36.77550516
Dec lon:	-120.37711338	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19510101
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	266	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	51		
Agency cd:	USGS	Site no:	364632120223404
Site name:	013S015E30B005M		
Latitude:	364632	EDR Site id:	USGS3202398
Longitude:	1202234	Dec lat:	36.77550516
Dec lon:	-120.37711338	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19661214
Date inventoried:	19680610	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	270	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	51		
Agency cd:	USGS	Site no:	364631120223902
Site name:	013S015E30C003M		
Latitude:	364631	EDR Site id:	USGS3202393
Longitude:	1202239	Dec lat:	36.7752274
Dec lon:	-120.3785023	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NWNENWS30 T13S R15E M
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19640627
Date inventoried:	19680610	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	225	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	51		
Agency cd:	USGS	Site no:	364631120223901
Site name:	013S015E30C001M		
Latitude:	364631	EDR Site id:	USGS3202392
Longitude:	1202239	Dec lat:	36.7752274
Dec lon:	-120.3785023	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	240	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1960-05-01	Ground water data end date:	1960-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05-01	34.00	

Map ID:	57		
Agency cd:	USGS	Site no:	364631120171401
Site name:	013S015E25F002M		
Latitude:	364631	EDR Site id:	USGS3202391
Longitude:	1201714	Dec lat:	36.77522684
Dec lon:	-120.28822175	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	NESENWS25 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	175.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19400404
Date inventoried:	19520911	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	120	Hole depth:	160
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	56		
Agency cd:	USGS	Site no:	364630120165101
Site name:	013S015E25A002M		
Latitude:	364630	EDR Site id:	USGS3202388
Longitude:	1201651	Dec lat:	36.77494903
Dec lon:	-120.28183266	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SENENES25 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	173		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19561212	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	58		
Agency cd:	USGS	Site no:	364630120163601
Site name:	013S015E25A001M		
Latitude:	364630	EDR Site id:	USGS3202387
Longitude:	1201636	Dec lat:	36.774949
Dec lon:	-120.27766586	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SENENES25 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	173.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19561212	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	51		
Agency cd:	USGS	Site no:	364629120224401
Site name:	013S015E30F001M		
Latitude:	364629	EDR Site id:	USGS3202385
Longitude:	1202244	Dec lat:	36.77467186
Dec lon:	-120.37989122	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19480101
Date inventoried:	Not Reported	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	265	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1960-05-01	Ground water data end date:	1960-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05-01	35.00	

Map ID:	51		
Agency cd:	USGS	Site no:	364629120224402
Site name:	013S015E30F002M		
Latitude:	364629	EDR Site id:	USGS3202386
Longitude:	1202244	Dec lat:	36.77467186
Dec lon:	-120.37989122	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NESENWS30 T13S R15E M
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19660319
Date inventoried:	19680610	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	242	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	51		
Agency cd:	USGS	Site no:	364629120223001
Site name:	013S015E30B007M		
Latitude:	364629	EDR Site id:	USGS3202384
Longitude:	1202230	Dec lat:	36.77467184
Dec lon:	-120.37600221	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NWNWSES30 T13S R15E M
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	159.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19610414
Date inventoried:	19680611	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	172	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	59		
Agency cd:	USGS	Site no:	364629120195701
Site name:	013S015E28H001M		
Latitude:	364629	EDR Site id:	USGS3202383
Longitude:	1201957	Dec lat:	36.77467157
Dec lon:	-120.3335009	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NENESES28 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19561127	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	400	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	60		
Agency cd:	USGS	Site no:	364626120225402
Site name:	013S015E30E003M		
Latitude:	364626	EDR Site id:	USGS3202381
Longitude:	1202254	Dec lat:	36.77383856
Dec lon:	-120.38266905	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NESWNWS30 T13S R15E M
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19660323
Date inventoried:	19680610	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	275	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	60		
Agency cd:	USGS	Site no:	364626120225401
Site name:	013S015E30E001M		
Latitude:	364626	EDR Site id:	USGS3202380
Longitude:	1202254	Dec lat:	36.77383856
Dec lon:	-120.38266905	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19480101
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	260	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1960-05-01	Ground water data end date:	1960-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05-01	37.00	

Map ID:	61		
Agency cd:	USGS	Site no:	364624120192001
Site name:	013S015E27F001M		
Latitude:	364624	EDR Site id:	USGS3202378
Longitude:	1201920	Dec lat:	36.77328264
Dec lon:	-120.32322277	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	19580228
Date inventoried:	19620913	Mean greenwich time offset:	PST

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	301	Hole depth:	302
Source of depth data:	driller		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1958-02-17	Ground water data end date:	1963-10-01
Ground water data count:	2		

Ground-water levels, Number of Measurements: 2

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1963-10-01	40.5		1958-02-17	37.5	

Map ID:	57		
Agency cd:	USGS	Site no:	364624120171101
Site name:	013S015E25F001M		
Latitude:	364624	EDR Site id:	USGS3202377
Longitude:	1201711	Dec lat:	36.77328242
Dec lon:	-120.28738834	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	NESENWS25 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	175.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	1951
Date inventoried:	19520911	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	242	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	62		
Agency cd:	USGS	Site no:	364623120181301
Site name:	013S015E26G001M		
Latitude:	364623	EDR Site id:	USGS3202376
Longitude:	1201813	Dec lat:	36.77300475
Dec lon:	-120.30461108	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	NWSWNES26 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	170.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	19510701
Date inventoried:	19510911	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	245	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	64		
Agency cd:	USGS	Site no:	364622120230301
Site name:	013S015E30E002M		
Latitude:	364622	EDR Site id:	USGS3202372
Longitude:	1202303	Dec lat:	36.77272748
Dec lon:	-120.3851691	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	162.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19470101
Date inventoried:	Not Reported	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	225	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1960-05-01	Ground water data end date:	1960-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05-01	38.00	

Map ID:	64		
Agency cd:	USGS	Site no:	364622120230302
Site name:	013S015E30E004M		
Latitude:	364622	EDR Site id:	USGS3202373
Longitude:	1202303	Dec lat:	36.77272748
Dec lon:	-120.3851691	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	SWSWNWS30 T13S R15E M
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19650630
Date inventoried:	19680610	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	235	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	65		
Agency cd:	USGS	Site no:	364620120175701
Site name:	013S015E26H001M		
Latitude:	364620	EDR Site id:	USGS3202368
Longitude:	1201757	Dec lat:	36.7721714
Dec lon:	-120.30016648	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SWSENES26 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	170.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	19510701
Date inventoried:	19510911	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	278	Hole depth:	278
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	66		
Agency cd:	USGS	Site no:	364618120223301
Site name:	013S015E30G001M		
Latitude:	364618	EDR Site id:	USGS3202365
Longitude:	1202233	Dec lat:	36.77161633
Dec lon:	-120.37683548	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	SESWNES30 T13S R15E M
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	159.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19561101
Date inventoried:	19580611	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	80.0	Hole depth:	80
Source of depth data:	driller		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	67		
Agency cd:	USGS	Site no:	364615120201001
Site name:	013S015E28G001M		
Latitude:	364615	EDR Site id:	USGS3202360
Longitude:	1202010	Dec lat:	36.77078277
Dec lon:	-120.33711201	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	162.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19600906
Date inventoried:	19630417	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	276	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	66		
Agency cd:	USGS	Site no:	364613120223502
Site name:	SLD @ MI 127.0		
Latitude:	364613	EDR Site id:	USGS3202353
Longitude:	1202235	Dec lat:	36.77022747
Dec lon:	-120.37739101	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	Not Reported		
Altitude method:	Not Reported		
Altitude accuracy:	2.5		
Altitude datum:	Not Reported		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1984-08-08
Water quality data end date:	1984-08-08	Water quality data count:	1
Ground water data begin date:	0000-00-00	Ground water data end date:	0000-00-00
Ground water data count:	0		

Ground-water levels, Number of Measurements: 0

Map ID:	66		
Agency cd:	USGS	Site no:	364613120223501
Site name:	SLD COLLECTOR @ MI 127.05		
Latitude:	364613	EDR Site id:	USGS3202352
Longitude:	1202235	Dec lat:	36.77022747
Dec lon:	-120.37739101	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	Not Reported		
Altitude method:	Not Reported		
Altitude accuracy:	2.5		
Altitude datum:	Not Reported		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1984-01-24
Water quality data end date:	1984-08-08	Water quality data count:	2
Ground water data begin date:	0000-00-00	Ground water data end date:	0000-00-00
Ground water data count:	0		

Ground-water levels, Number of Measurements: 0

Map ID:	71		
Agency cd:	USGS	Site no:	364613120175801
Site name:	013S015E26K001M		
Latitude:	364613	EDR Site id:	USGS3202351
Longitude:	1201758	Dec lat:	36.77022699
Dec lon:	-120.30044421	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SENWSES26 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	170.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	19510701
Date inventoried:	19510911	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	242	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	68		
Agency cd:	USGS	Site no:	364616120150301
Site name:	013S016E30L001M		
Latitude:	364612	EDR Site id:	USGS3202361
Longitude:	1201607	Dec lat:	36.76994902
Dec lon:	-120.26960992	Coor meth:	M
Coor accr:	M	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	S30 T13S R16E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	175.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	52		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19741108	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	300	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1963-10-01	Ground water data end date:	1963-10-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1963-10-01	54.50	

Map ID:	70		
Agency cd:	USGS	Site no:	364611120172301
Site name:	013S015E25L001M		
Latitude:	364611	EDR Site id:	USGS3202350
Longitude:	1201723	Dec lat:	36.76967138
Dec lon:	-120.29072167	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	NWNESWS25 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	172.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	195106
Date inventoried:	19520911	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	268	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	78		
Agency cd:	USGS	Site no:	364553120172901
Site name:	013S015E25N001M		
Latitude:	364553	EDR Site id:	USGS3202343
Longitude:	1201729	Dec lat:	36.76467146
Dec lon:	-120.29238825	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SESWSWS25 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	170.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19510701
Date inventoried:	19520911	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	268	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	77		
Agency cd:	USGS	Site no:	364553120172001
Site name:	013S015E25P001M		
Latitude:	364553	EDR Site id:	USGS3202342
Longitude:	1201720	Dec lat:	36.76467145
Dec lon:	-120.28988817	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	039
Country:	US	Land net:	SESESWS25 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	170.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flood plain		
Site type:	Ground-water other than Spring	Date construction:	19510601
Date inventoried:	19520911	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	258	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1964-08-01	Ground water data end date:	1964-08-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1964-08-01	87.00	

Map ID:	81		
Agency cd:	USGS	Site no:	364544120184601
Site name:	013S015E35D004M		
Latitude:	364544	EDR Site id:	USGS3202484
Longitude:	1201846	Dec lat:	36.76217164
Dec lon:	-120.31377772	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19520724
Date inventoried:	19620919	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	51.0	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1962-09-01	Ground water data end date:	1962-09-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1962-09-01	15.00	

Map ID:	82		
Agency cd:	USGS	Site no:	364539120223501
Site name:	013S015E31B001M		
Latitude:	364539	EDR Site id:	USGS3202481
Longitude:	1202235	Dec lat:	36.76078318
Dec lon:	-120.37739073	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	SWNWNES31 T13S R15E M
Location map:	FIREBAUGH	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19530912
Date inventoried:	19530912	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	324	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1959-05-01	Ground water data end date:	1959-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1959-05-01	51.00	

Map ID:	83		
Agency cd:	USGS	Site no:	364536120184801
Site name:	013S015E34A001M		
Latitude:	364536	EDR Site id:	USGS3202479
Longitude:	1201848	Dec lat:	36.75994945
Dec lon:	-120.31433323	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19580222
Date inventoried:	19620913	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	280	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	83		
Agency cd:	USGS	Site no:	364536120184301
Site name:	013S015E35D005M		
Latitude:	364536	EDR Site id:	USGS3202478
Longitude:	1201843	Dec lat:	36.75994944
Dec lon:	-120.31294429	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	S35T13SR15EM
Location map:	MENDOTA DAM	Map scale:	24000

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19650411
Date inventoried:	19660318	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	433	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	479400204		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1965-08-27
Water quality data end date:	1965-08-27	Water quality data count:	1
Ground water data begin date:	1965-08-26	Ground water data end date:	1983-01-03
Ground water data count:	3651		

Ground-water levels, Number of Measurements: 3651

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1983-01-03	31.7		1982-12-27	32.4	
1982-12-26	32.7		1982-12-23	32.8	
1982-12-22	33.1		1982-12-21	33.2	
1982-12-14	33.3		1982-12-09	33.4	
1982-12-08	33.7		1982-12-07	33.7	
1982-12-06	34.2		1982-12-03	34.3	
1982-12-02	34.5		1982-12-01	34.8	
1982-11-30	35.0		1982-11-29	35.2	
1982-11-25	35.3		1982-11-24	35.4	
1982-11-23	36.0		1982-11-19	36.1	
1982-11-17	36.2		1982-11-14	36.3	
1982-11-13	36.7		1982-11-12	37.2	
1982-11-11	37.2		1982-11-10	37.4	
1982-11-09	38.1		1982-11-08	38.2	
1982-11-07	38.4		1982-11-06	38.6	
1982-11-05	39.2		1982-11-04	39.8	
1982-11-03	40.2		1982-11-02	40.3	
1982-11-01	41.0		1982-10-31	41.3	
1982-10-30	42.1		1982-10-29	42.2	
1982-10-28	43.0		1982-10-27	43.9	
1982-10-26	44.2		1982-10-25	44.2	
1982-10-24	45.1		1982-10-23	45.2	
1982-10-20	45.3		1982-10-18	45.2	
1982-10-15	45.1		1982-10-14	44.9	
1982-10-13	45.1		1982-10-12	45.3	
1982-10-11	46.1		1982-10-10	46.3	
1982-10-09	46.4		1982-10-08	46.5	
1982-10-07	46.7		1982-10-06	47.2	
1982-10-05	47.6		1982-10-04	48.4	
1982-10-03	49.2		1982-10-02	50.1	
1982-10-01	50.1		1982-09-30	50.2	
1982-09-29	50.2		1982-09-28	50.2	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1982-09-27	51.2	
1982-09-25	53.0	
1982-09-23	54.0	
1982-09-21	55.3	
1982-09-19	55.5	
1982-09-17	55.2	
1982-09-15	56.2	
1982-09-13	57.2	
1982-09-11	59.1	
1982-09-09	60.2	
1982-09-07	62.1	
1982-09-05	64.0	
1982-09-03	67.1	
1982-09-01	69.1	
1982-08-30	70.0	
1982-08-28	68.9	
1982-08-26	67.1	
1982-08-24	67.7	
1982-08-22	68.8	
1982-08-20	68.7	
1982-08-18	68.9	
1982-08-16	69.9	
1982-08-14	71.9	
1982-08-12	71.9	
1982-08-10	70.9	
1982-08-08	70.5	
1982-08-06	69.9	
1982-08-04	69.9	
1982-08-02	69.7	
1982-07-31	67.0	
1982-07-29	66.1	
1982-07-27	65.0	
1982-07-25	64.4	
1982-07-23	62.5	
1982-07-21	60.9	
1982-07-19	58.9	
1982-07-17	57.4	
1982-07-15	56.7	
1982-07-13	56.2	
1982-07-11	58.9	
1982-07-09	59.1	
1982-07-07	60.2	
1982-07-05	61.0	
1982-07-03	61.1	
1982-07-01	61.0	
1982-06-29	61.1	
1982-06-27	61.0	
1982-06-25	60.9	
1982-06-23	59.2	
1982-06-21	56.8	
1982-06-19	53.9	
1982-06-17	51.1	
1982-06-15	50.6	
1982-06-13	49.9	
1982-06-11	50.1	
1982-09-26	52.2	
1982-09-24	53.2	
1982-09-22	55.1	
1982-09-20	55.7	
1982-09-18	55.1	
1982-09-16	56.0	
1982-09-14	57.2	
1982-09-12	58.2	
1982-09-10	59.6	
1982-09-08	61.2	
1982-09-06	62.2	
1982-09-04	65.4	
1982-09-02	68.2	
1982-08-31	69.9	
1982-08-29	70.0	
1982-08-27	67.8	
1982-08-25	67.3	
1982-08-23	67.2	
1982-08-21	68.7	
1982-08-19	68.7	
1982-08-17	69.9	
1982-08-15	71.9	
1982-08-13	71.9	
1982-08-11	71.9	
1982-08-09	70.9	
1982-08-07	69.9	
1982-08-05	69.9	
1982-08-03	69.9	
1982-08-01	69.0	
1982-07-30	66.4	
1982-07-28	65.9	
1982-07-26	64.9	
1982-07-24	63.0	
1982-07-22	61.8	
1982-07-20	59.7	
1982-07-18	57.9	
1982-07-16	57.0	
1982-07-14	56.1	
1982-07-12	56.9	
1982-07-10	59.0	
1982-07-08	59.9	
1982-07-06	61.0	
1982-07-04	61.0	
1982-07-02	61.0	
1982-06-30	61.2	
1982-06-28	61.0	
1982-06-26	61.0	
1982-06-24	59.9	
1982-06-22	58.0	
1982-06-20	54.9	
1982-06-18	52.6	
1982-06-16	50.9	
1982-06-14	50.0	
1982-06-12	49.9	
1982-06-10	50.3	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1982-06-09	50.3	
1982-06-07	51.1	
1982-04-29	48.1	
1982-04-27	45.7	
1982-04-25	42.3	
1982-04-23	38.6	
1982-04-21	37.7	
1982-04-19	34.8	
1982-04-17	34.8	
1982-04-15	35.7	
1982-04-13	36.5	
1982-04-11	38.0	
1982-04-09	38.7	
1982-04-07	40.7	
1982-04-05	43.5	
1982-04-03	44.8	
1982-04-01	45.9	
1982-03-30	46.8	
1982-03-28	47.4	
1982-03-26	47.8	
1982-03-24	49.9	
1982-03-22	52.5	
1982-03-20	57.8	
1982-03-18	62.2	
1982-03-16	63.7	
1982-03-14	64.5	
1982-03-12	63.5	
1982-03-10	61.4	
1982-03-08	60.6	
1982-03-06	60.6	
1982-03-04	60.4	
1982-03-02	59.6	
1982-02-28	56.5	
1982-02-26	54.4	
1982-02-24	52.8	
1982-02-22	52.1	
1982-02-20	50.3	
1982-02-18	48.2	
1982-02-16	48.0	
1982-02-14	47.5	
1982-02-12	46.4	
1982-02-10	44.5	
1982-02-08	43.4	
1982-02-06	42.1	
1982-02-04	41.1	
1982-02-02	40.6	
1982-01-31	39.6	
1982-01-29	39.3	
1982-01-27	37.4	
1982-01-25	36.9	
1982-01-23	37.5	
1982-01-21	38.3	
1981-09-15	69.7	
1981-07-13	90.4	
1981-07-11	90.7	

Date	Feet below Surface	Feet to Sealevel
1982-06-08	51.0	
1982-04-30	48.8	
1982-04-28	47.3	
1982-04-26	43.8	
1982-04-24	40.3	
1982-04-22	38.4	
1982-04-20	36.7	
1982-04-18	34.3	
1982-04-16	34.8	
1982-04-14	35.9	
1982-04-12	37.0	
1982-04-10	38.3	
1982-04-08	39.7	
1982-04-06	41.9	
1982-04-04	44.8	
1982-04-02	45.8	
1982-03-31	46.3	
1982-03-29	47.0	
1982-03-27	47.6	
1982-03-25	49.0	
1982-03-23	51.4	
1982-03-21	54.2	
1982-03-19	59.7	
1982-03-17	63.6	
1982-03-15	64.5	
1982-03-13	64.3	
1982-03-11	62.5	
1982-03-09	60.5	
1982-03-07	60.8	
1982-03-05	60.4	
1982-03-03	59.9	
1982-03-01	58.5	
1982-02-27	55.6	
1982-02-25	53.4	
1982-02-23	52.4	
1982-02-21	51.1	
1982-02-19	49.3	
1982-02-17	47.7	
1982-02-15	47.9	
1982-02-13	47.4	
1982-02-11	45.5	
1982-02-09	43.9	
1982-02-07	42.5	
1982-02-05	41.4	
1982-02-03	40.5	
1982-02-01	40.4	
1982-01-30	39.4	
1982-01-28	38.5	
1982-01-26	36.9	
1982-01-24	37.2	
1982-01-22	38.2	
1981-11-18	40.6	
1981-07-14	89.3	
1981-07-12	90.5	
1981-07-10	90.8	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1981-07-09	90.6	
1981-07-07	90.4	
1981-07-05	89.1	
1981-07-03	87.7	
1981-07-01	86.2	
1981-06-29	82.3	
1981-06-27	81.7	
1981-06-25	80.4	
1981-06-23	79.6	
1981-06-21	75.7	
1981-06-19	69.5	
1981-06-17	65.3	
1981-06-15	62.7	
1981-06-13	61.9	
1981-06-11	61.6	
1981-06-09	61.4	
1981-06-07	61.1	
1981-06-05	61.3	
1981-06-03	62.4	
1981-06-01	62.9	
1981-05-30	63.0	
1981-05-28	62.0	
1981-05-26	61.1	
1981-05-24	61.2	
1981-05-22	60.9	
1981-05-20	60.0	
1981-05-18	61.1	
1981-05-16	64.7	
1981-05-14	66.7	
1981-05-12	65.9	
1981-05-10	65.3	
1981-05-08	63.8	
1981-05-06	63.0	
1981-05-04	60.2	
1981-05-02	56.4	
1981-04-30	53.7	
1981-04-28	52.6	
1981-04-23	53.1	
1981-04-21	55.3	
1981-04-19	57.8	
1981-04-16	59.0	
1981-04-14	57.5	
1981-04-12	53.1	
1981-04-10	48.4	
1981-04-08	42.8	
1981-04-06	40.4	
1981-04-01	40.6	
1981-03-30	42.0	
1981-03-28	42.6	
1981-03-26	44.8	
1981-03-24	45.9	
1981-03-22	46.4	
1981-03-19	46.6	
1981-03-17	47.3	
1981-03-15	51.2	
1981-07-08	90.4	
1981-07-06	90.1	
1981-07-04	88.4	
1981-07-02	86.8	
1981-06-30	84.1	
1981-06-28	81.8	
1981-06-26	81.5	
1981-06-24	80.2	
1981-06-22	77.7	
1981-06-20	72.8	
1981-06-18	67.3	
1981-06-16	63.9	
1981-06-14	62.5	
1981-06-12	61.8	
1981-06-10	61.4	
1981-06-08	61.3	
1981-06-06	61.1	
1981-06-04	61.7	
1981-06-02	62.8	
1981-05-31	63.2	
1981-05-29	62.5	
1981-05-27	61.8	
1981-05-25	61.3	
1981-05-23	61.0	
1981-05-21	60.7	
1981-05-19	59.9	
1981-05-17	62.7	
1981-05-15	66.3	
1981-05-13	66.8	
1981-05-11	65.2	
1981-05-09	64.9	
1981-05-07	63.6	
1981-05-05	61.5	
1981-05-03	57.9	
1981-05-01	55.7	
1981-04-29	52.7	
1981-04-27	53.0	
1981-04-22	54.2	
1981-04-20	56.3	
1981-04-18	58.9	
1981-04-15	58.7	
1981-04-13	55.5	
1981-04-11	51.0	
1981-04-09	45.4	
1981-04-07	41.2	
1981-04-02	40.5	
1981-03-31	41.3	
1981-03-29	42.5	
1981-03-27	44.2	
1981-03-25	45.6	
1981-03-23	46.3	
1981-03-20	46.5	
1981-03-18	46.7	
1981-03-16	47.7	
1981-03-14	52.3	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1981-03-13	52.6	
1981-03-09	52.6	
1981-03-07	52.3	
1981-03-05	52.6	
1981-03-03	52.8	
1981-03-01	53.3	
1981-02-27	53.5	
1981-02-25	55.3	
1981-02-21	54.7	
1981-02-19	52.8	
1981-02-15	52.9	
1981-02-11	53.2	
1981-02-06	53.2	
1981-02-04	52.9	
1981-02-01	52.4	
1981-01-30	50.9	
1981-01-28	48.6	
1981-01-26	47.2	
1981-01-24	45.6	
1981-01-22	44.9	
1981-01-20	44.3	
1981-01-18	43.2	
1981-01-14	42.5	
1981-01-12	41.6	
1981-01-10	40.9	
1981-01-08	38.5	
1981-01-06	36.1	
1981-01-03	35.8	
1981-01-01	36.2	
1980-12-30	36.8	
1980-12-28	37.2	
1980-12-20	37.0	
1980-12-12	37.2	
1980-12-08	37.5	
1980-12-05	37.8	
1980-11-29	38.0	
1980-11-26	38.5	
1980-11-19	38.7	
1980-11-17	39.0	
1980-09-24	53.5	
1980-09-22	53.9	
1980-09-20	55.9	
1980-09-17	57.4	
1980-09-15	58.5	
1980-09-13	61.6	
1980-09-11	65.7	
1980-09-09	68.5	
1980-09-07	71.1	
1980-09-04	71.6	
1980-09-02	71.2	
1980-08-29	70.9	
1980-08-27	71.5	
1980-08-25	73.5	
1980-08-23	75.6	
1980-08-21	77.3	
1981-03-10	52.7	
1981-03-08	52.5	
1981-03-06	52.3	
1981-03-04	52.7	
1981-03-02	53.0	
1981-02-28	53.4	
1981-02-26	54.3	
1981-02-22	55.4	
1981-02-20	53.8	
1981-02-16	52.7	
1981-02-14	53.1	
1981-02-10	53.3	
1981-02-05	53.0	
1981-02-03	52.5	
1981-01-31	51.8	
1981-01-29	49.9	
1981-01-27	48.4	
1981-01-25	46.5	
1981-01-23	45.4	
1981-01-21	44.4	
1981-01-19	44.2	
1981-01-17	42.6	
1981-01-13	42.1	
1981-01-11	41.6	
1981-01-09	39.6	
1981-01-07	37.3	
1981-01-05	35.9	
1981-01-02	36.0	
1980-12-31	36.5	
1980-12-29	37.1	
1980-12-22	37.1	
1980-12-15	37.1	
1980-12-11	37.4	
1980-12-07	37.7	
1980-12-02	37.9	
1980-11-28	38.4	
1980-11-20	38.6	
1980-11-18	39.1	
1980-09-25	53.3	
1980-09-23	54.0	
1980-09-21	55.5	
1980-09-19	56.5	
1980-09-16	58.4	
1980-09-14	60.3	
1980-09-12	63.0	
1980-09-10	67.6	
1980-09-08	69.7	
1980-09-06	71.7	
1980-09-03	71.5	
1980-08-30	71.1	
1980-08-28	71.3	
1980-08-26	72.5	
1980-08-24	74.7	
1980-08-22	76.5	
1980-08-20	77.5	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1980-08-18	77.6	
1980-08-16	79.6	
1980-08-14	78.6	
1980-08-12	78.4	
1980-08-10	79.1	
1980-08-08	79.5	
1980-08-05	79.7	
1980-08-03	78.5	
1980-08-01	75.5	
1980-07-30	73.3	
1980-07-28	70.3	
1980-07-26	69.0	
1980-07-24	68.6	
1980-07-22	66.6	
1980-07-20	64.9	
1980-07-18	63.3	
1980-07-16	61.7	
1980-07-14	59.7	
1980-07-12	60.0	
1980-07-10	62.0	
1980-07-07	62.6	
1980-07-05	63.7	
1980-07-03	63.3	
1980-07-01	62.8	
1980-06-29	64.0	
1980-06-27	64.6	
1980-06-25	64.0	
1980-06-22	62.5	
1980-06-20	60.0	
1980-06-18	55.2	
1980-06-16	52.9	
1980-06-14	52.2	
1980-06-12	52.8	
1980-06-10	53.0	
1980-06-08	54.0	
1980-06-04	54.6	
1980-06-02	56.0	
1980-05-31	56.9	
1980-05-28	56.7	
1980-05-26	57.0	
1980-05-21	56.1	
1980-05-18	62.6	
1980-05-16	62.8	
1980-05-14	62.5	
1980-05-11	62.6	
1980-05-08	62.4	
1980-05-06	61.4	
1980-05-04	60.5	
1980-05-02	60.3	
1980-04-30	62.4	
1980-04-26	62.4	
1980-04-24	63.2	
1980-04-22	64.2	
1980-04-20	63.6	
1980-04-18	61.5	
1980-08-17	78.5	
1980-08-15	79.5	
1980-08-13	78.3	
1980-08-11	78.1	
1980-08-09	79.3	
1980-08-06	79.6	
1980-08-04	79.1	
1980-08-02	77.0	
1980-07-31	74.0	
1980-07-29	71.8	
1980-07-27	69.6	
1980-07-25	68.6	
1980-07-23	68.3	
1980-07-21	65.2	
1980-07-19	64.2	
1980-07-17	62.2	
1980-07-15	60.0	
1980-07-13	59.8	
1980-07-11	60.2	
1980-07-09	62.5	
1980-07-06	63.0	
1980-07-04	63.7	
1980-07-02	62.9	
1980-06-30	63.4	
1980-06-28	64.3	
1980-06-26	64.8	
1980-06-23	63.9	
1980-06-21	61.4	
1980-06-19	57.7	
1980-06-17	53.8	
1980-06-15	52.2	
1980-06-13	52.6	
1980-06-11	52.9	
1980-06-09	53.3	
1980-06-05	54.1	
1980-06-03	55.2	
1980-06-01	56.5	
1980-05-29	57.0	
1980-05-27	56.2	
1980-05-22	57.0	
1980-05-19	56.2	
1980-05-17	63.2	
1980-05-15	62.7	
1980-05-12	62.4	
1980-05-09	62.7	
1980-05-07	61.7	
1980-05-05	60.8	
1980-05-03	60.0	
1980-05-01	61.6	
1980-04-27	62.4	
1980-04-25	62.5	
1980-04-23	63.7	
1980-04-21	64.4	
1980-04-19	62.7	
1980-04-17	59.5	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1980-04-16	57.8	
1980-04-14	56.2	
1980-04-12	53.7	
1980-04-10	53.9	
1980-04-08	54.1	
1980-04-06	54.3	
1980-04-04	53.3	
1980-04-02	51.4	
1980-03-31	52.1	
1980-03-29	51.7	
1980-03-27	51.3	
1980-03-25	48.7	
1980-01-17	38.4	
1980-01-15	38.7	
1980-01-10	39.0	
1980-01-08	39.0	
1980-01-06	39.4	
1979-12-29	40.4	
1979-12-25	40.9	
1979-12-18	41.0	
1979-12-15	40.5	
1979-12-11	40.2	
1979-12-07	39.7	
1979-12-03	39.5	
1979-11-29	39.7	
1979-11-25	40.7	
1979-11-21	41.1	
1979-11-16	40.8	
1979-11-14	40.5	
1979-11-12	41.7	
1979-11-10	42.2	
1979-11-07	42.5	
1979-11-05	42.8	
1979-11-03	43.1	
1979-11-01	43.5	
1979-10-30	44.3	
1979-10-28	45.2	
1979-10-26	45.7	
1979-10-24	45.6	
1979-10-22	46.3	
1979-10-20	47.2	
1979-10-18	47.9	
1979-10-16	49.0	
1979-10-14	49.6	
1979-10-12	50.9	
1979-10-10	52.2	
1979-10-08	52.7	
1979-10-06	52.8	
1979-10-04	53.9	
1979-10-02	55.5	
1979-09-30	57.8	
1979-09-28	58.5	
1979-09-26	58.5	
1979-09-23	58.9	
1979-09-21	59.4	
1980-04-15	56.6	
1980-04-13	54.0	
1980-04-11	53.8	
1980-04-09	54.0	
1980-04-07	54.2	
1980-04-05	54.4	
1980-04-03	52.3	
1980-04-01	51.4	
1980-03-30	52.0	
1980-03-28	51.8	
1980-03-26	49.8	
1980-01-22	34.7	
1980-01-16	38.5	
1980-01-14	38.9	
1980-01-09	38.7	
1980-01-07	39.2	
1979-12-30	39.7	
1979-12-26	40.7	
1979-12-24	41.0	
1979-12-17	40.7	
1979-12-12	40.5	
1979-12-08	39.9	
1979-12-06	39.4	
1979-12-02	39.7	
1979-11-28	40.4	
1979-11-24	41.0	
1979-11-17	41.0	
1979-11-15	40.7	
1979-11-13	40.3	
1979-11-11	41.8	
1979-11-08	42.4	
1979-11-06	42.7	
1979-11-04	43.0	
1979-11-02	43.1	
1979-10-31	44.0	
1979-10-29	44.6	
1979-10-27	45.5	
1979-10-25	45.6	
1979-10-23	46.0	
1979-10-21	46.7	
1979-10-19	47.5	
1979-10-17	48.5	
1979-10-15	49.4	
1979-10-13	50.1	
1979-10-11	51.5	
1979-10-09	52.5	
1979-10-07	52.8	
1979-10-05	53.6	
1979-10-03	54.5	
1979-10-01	56.7	
1979-09-29	58.3	
1979-09-27	58.6	
1979-09-24	58.5	
1979-09-22	59.2	
1979-09-20	59.6	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1979-09-19	59.8	
1979-09-17	60.0	
1979-09-15	61.1	
1979-09-13	62.8	
1979-09-11	64.5	
1979-09-09	67.1	
1979-09-07	68.0	
1979-09-05	70.3	
1979-09-03	73.3	
1979-09-01	76.6	
1979-08-30	79.5	
1979-08-28	80.5	
1979-08-26	83.3	
1979-08-24	83.5	
1979-08-22	83.4	
1979-08-20	83.3	
1979-08-18	85.0	
1979-08-16	86.5	
1979-08-14	88.2	
1979-08-12	88.7	
1979-08-10	89.3	
1979-08-08	89.0	
1979-08-06	89.0	
1979-08-04	87.3	
1979-08-02	85.3	
1979-07-31	85.5	
1979-07-29	84.5	
1979-07-27	83.8	
1979-07-25	82.1	
1979-07-23	81.3	
1979-07-21	79.1	
1979-07-19	78.2	
1979-07-17	77.2	
1979-07-15	77.8	
1979-07-13	78.1	
1979-07-11	79.0	
1979-07-09	79.0	
1979-07-07	77.8	
1979-07-05	76.0	
1979-07-03	74.8	
1979-07-01	74.4	
1979-06-29	75.0	
1979-06-27	75.5	
1979-06-25	75.6	
1979-06-23	75.8	
1979-06-21	74.8	
1979-06-19	74.8	
1979-06-17	73.5	
1979-06-15	69.8	
1979-06-13	67.4	
1979-06-11	66.6	
1979-06-09	64.8	
1979-06-07	64.4	
1979-06-05	63.7	
1979-06-03	62.0	

Date	Feet below Surface	Feet to Sealevel
1979-09-18	60.0	
1979-09-16	60.3	
1979-09-14	61.9	
1979-09-12	63.5	
1979-09-10	66.1	
1979-09-08	67.6	
1979-09-06	68.9	
1979-09-04	72.0	
1979-09-02	75.3	
1979-08-31	78.0	
1979-08-29	80.0	
1979-08-27	82.0	
1979-08-25	83.3	
1979-08-23	83.5	
1979-08-21	83.3	
1979-08-19	83.9	
1979-08-17	85.3	
1979-08-15	87.4	
1979-08-13	88.5	
1979-08-11	89.1	
1979-08-09	89.0	
1979-08-07	89.3	
1979-08-05	88.4	
1979-08-03	86.0	
1979-08-01	85.3	
1979-07-30	85.3	
1979-07-28	84.3	
1979-07-26	82.6	
1979-07-24	81.3	
1979-07-22	80.1	
1979-07-20	78.3	
1979-07-18	77.6	
1979-07-16	78.0	
1979-07-14	77.8	
1979-07-12	78.7	
1979-07-10	79.5	
1979-07-08	78.0	
1979-07-06	77.4	
1979-07-04	75.1	
1979-07-02	74.7	
1979-06-30	74.7	
1979-06-28	75.4	
1979-06-26	75.6	
1979-06-24	75.7	
1979-06-22	75.5	
1979-06-20	74.8	
1979-06-18	74.0	
1979-06-16	71.8	
1979-06-14	68.8	
1979-06-12	66.8	
1979-06-10	65.9	
1979-06-08	64.2	
1979-06-06	64.5	
1979-06-04	62.0	
1979-06-02	61.8	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1979-06-01	61.6	
1979-05-30	59.9	
1979-05-28	58.4	
1979-05-26	56.6	
1979-05-24	55.9	
1979-05-22	51.9	
1979-05-20	49.8	
1979-05-18	49.6	
1979-05-16	49.8	
1979-05-14	50.2	
1979-05-12	53.2	
1979-05-10	54.2	
1979-05-08	54.9	
1979-05-06	55.6	
1979-05-04	56.2	
1979-05-02	57.1	
1979-04-29	56.5	
1979-04-27	54.6	
1979-04-24	53.4	
1979-04-22	53.6	
1979-04-20	52.4	
1979-04-18	50.8	
1979-04-16	48.6	
1979-04-14	47.5	
1979-04-12	46.5	
1979-04-10	44.2	
1979-04-08	39.9	
1979-04-06	37.9	
1979-04-04	37.8	
1979-04-02	38.6	
1979-03-31	39.4	
1979-03-29	40.4	
1979-03-27	40.9	
1979-03-24	41.3	
1979-03-19	41.4	
1979-03-17	39.8	
1979-03-15	37.8	
1979-03-13	37.4	
1979-03-06	36.8	
1979-03-04	37.2	
1979-03-02	38.1	
1979-02-27	38.6	
1979-02-24	38.7	
1979-02-22	37.8	
1979-02-20	36.0	
1979-02-18	35.1	
1979-02-14	34.8	
1979-02-09	35.5	
1979-02-05	35.7	
1979-02-02	35.9	
1979-01-31	36.2	
1979-01-29	36.5	
1979-01-27	36.7	
1979-01-21	36.9	
1979-01-18	37.1	

Date	Feet below Surface	Feet to Sealevel
1979-05-31	60.8	
1979-05-29	59.1	
1979-05-27	57.5	
1979-05-25	56.4	
1979-05-23	54.0	
1979-05-21	50.0	
1979-05-19	49.8	
1979-05-17	49.7	
1979-05-15	49.6	
1979-05-13	51.9	
1979-05-11	53.5	
1979-05-09	54.6	
1979-05-07	54.9	
1979-05-05	55.9	
1979-05-03	56.5	
1979-04-30	57.2	
1979-04-28	55.3	
1979-04-26	53.5	
1979-04-23	53.5	
1979-04-21	53.4	
1979-04-19	51.9	
1979-04-17	49.4	
1979-04-15	48.0	
1979-04-13	47.4	
1979-04-11	45.3	
1979-04-09	42.2	
1979-04-07	38.5	
1979-04-05	37.7	
1979-04-03	38.3	
1979-04-01	39.0	
1979-03-30	40.0	
1979-03-28	40.7	
1979-03-26	41.2	
1979-03-23	41.4	
1979-03-18	40.8	
1979-03-16	38.3	
1979-03-14	37.5	
1979-03-07	36.7	
1979-03-05	37.0	
1979-03-03	37.6	
1979-03-01	38.6	
1979-02-25	38.8	
1979-02-23	38.1	
1979-02-21	37.7	
1979-02-19	35.9	
1979-02-17	34.8	
1979-02-11	35.6	
1979-02-06	35.6	
1979-02-03	35.8	
1979-02-01	36.0	
1979-01-30	36.3	
1979-01-28	36.6	
1979-01-24	36.8	
1979-01-20	37.0	
1979-01-17	37.4	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1979-01-16	37.6	
1979-01-14	37.9	
1979-01-10	37.9	
1979-01-01	41.2	
1978-12-25	41.1	
1978-12-10	41.4	
1978-11-27	42.6	
1978-11-20	43.1	
1978-11-18	44.1	
1978-11-16	44.7	
1978-11-10	45.0	
1978-11-01	45.2	
1978-10-25	45.3	
1978-10-17	45.5	
1978-10-15	46.9	
1978-10-13	47.6	
1978-10-11	49.2	
1978-10-09	51.0	
1978-10-07	52.9	
1978-10-04	53.3	
1978-09-30	53.1	
1978-09-28	53.7	
1978-09-26	54.2	
1978-09-24	55.1	
1978-09-22	56.0	
1978-09-20	57.2	
1978-09-18	59.2	
1978-09-16	61.3	
1978-09-14	64.2	
1978-09-12	68.2	
1978-09-10	74.2	
1978-09-08	79.5	
1978-09-06	83.8	
1978-09-04	86.0	
1978-09-02	86.2	
1978-08-31	85.0	
1978-08-29	82.7	
1978-08-27	84.2	
1978-08-25	83.9	
1978-08-23	88.7	
1978-08-21	90.5	
1978-08-19	92.9	
1978-08-17	92.3	
1978-08-15	91.0	
1978-08-13	90.3	
1978-08-11	88.1	
1978-08-09	86.3	
1978-08-07	87.1	
1978-08-05	88.5	
1978-08-02	88.7	
1978-07-31	88.8	
1978-07-29	88.8	
1978-07-27	88.6	
1978-07-25	87.6	
1978-07-23	86.8	
1979-01-15	37.7	
1979-01-11	38.0	
1979-01-06	40.8	
1978-12-30	41.2	
1978-12-20	41.3	
1978-11-30	42.1	
1978-11-25	43.0	
1978-11-19	43.6	
1978-11-17	44.5	
1978-11-15	44.9	
1978-11-05	45.1	
1978-10-30	45.1	
1978-10-20	45.4	
1978-10-16	46.6	
1978-10-14	47.1	
1978-10-12	48.3	
1978-10-10	50.0	
1978-10-08	51.9	
1978-10-06	53.2	
1978-10-01	53.2	
1978-09-29	53.2	
1978-09-27	54.0	
1978-09-25	54.5	
1978-09-23	55.6	
1978-09-21	56.4	
1978-09-19	58.2	
1978-09-17	60.1	
1978-09-15	62.5	
1978-09-13	65.7	
1978-09-11	70.9	
1978-09-09	76.8	
1978-09-07	82.2	
1978-09-05	85.5	
1978-09-03	86.5	
1978-09-01	85.4	
1978-08-30	84.3	
1978-08-28	82.6	
1978-08-26	85.4	
1978-08-24	87.9	
1978-08-22	89.8	
1978-08-20	90.8	
1978-08-18	93.0	
1978-08-16	91.5	
1978-08-14	90.6	
1978-08-12	89.4	
1978-08-10	86.7	
1978-08-08	86.4	
1978-08-06	88.1	
1978-08-03	88.6	
1978-08-01	88.9	
1978-07-30	88.9	
1978-07-28	88.7	
1978-07-26	88.3	
1978-07-24	86.6	
1978-07-22	86.7	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1978-07-21	86.1	
1978-07-19	85.7	
1978-07-17	86.1	
1978-07-15	84.3	
1978-07-13	81.1	
1978-07-11	78.8	
1978-07-09	78.8	
1978-07-07	77.9	
1978-07-05	76.2	
1978-07-03	73.2	
1978-07-01	71.4	
1978-06-29	70.6	
1978-06-27	69.6	
1978-06-25	66.9	
1978-06-23	65.6	
1978-06-20	65.6	
1978-06-18	62.9	
1978-06-16	61.5	
1978-06-14	58.8	
1978-06-12	56.9	
1978-06-10	55.1	
1978-06-08	51.8	
1978-06-06	50.4	
1978-06-04	51.6	
1978-06-02	50.5	
1978-05-31	50.4	
1978-05-29	49.6	
1978-05-27	49.9	
1978-05-25	49.6	
1978-05-23	47.7	
1978-05-21	46.4	
1978-05-19	45.8	
1978-05-17	45.1	
1978-05-15	43.6	
1978-05-13	41.6	
1978-05-11	40.8	
1978-05-09	40.0	
1978-05-06	40.0	
1978-05-02	40.2	
1978-04-30	40.9	
1978-04-25	41.1	
1978-01-26	48.2	
1978-01-24	48.8	
1978-01-22	49.0	
1978-01-20	49.2	
1978-01-18	49.5	
1978-01-16	49.9	
1978-01-14	50.5	
1978-01-11	50.9	
1978-01-09	50.9	
1978-01-06	51.2	
1978-01-04	51.8	
1978-01-02	52.7	
1977-12-31	53.7	
1977-12-29	54.2	

Date	Feet below Surface	Feet to Sealevel
1978-07-20	85.6	
1978-07-18	85.9	
1978-07-16	85.7	
1978-07-14	82.5	
1978-07-12	79.6	
1978-07-10	78.7	
1978-07-08	78.6	
1978-07-06	77.0	
1978-07-04	74.8	
1978-07-02	72.2	
1978-06-30	71.0	
1978-06-28	70.3	
1978-06-26	68.4	
1978-06-24	65.8	
1978-06-21	65.7	
1978-06-19	63.5	
1978-06-17	62.7	
1978-06-15	60.3	
1978-06-13	57.8	
1978-06-11	56.8	
1978-06-09	52.5	
1978-06-07	50.8	
1978-06-05	50.2	
1978-06-03	50.9	
1978-06-01	49.8	
1978-05-30	49.9	
1978-05-28	50.1	
1978-05-26	49.7	
1978-05-24	48.5	
1978-05-22	47.0	
1978-05-20	45.9	
1978-05-18	45.7	
1978-05-16	44.5	
1978-05-14	42.5	
1978-05-12	41.3	
1978-05-10	40.3	
1978-05-08	39.9	
1978-05-04	40.1	
1978-05-01	40.8	
1978-04-28	41.0	
1978-01-27	45.3	
1978-01-25	48.6	
1978-01-23	48.9	
1978-01-21	49.1	
1978-01-19	49.3	
1978-01-17	49.7	
1978-01-15	50.1	
1978-01-12	50.7	
1978-01-10	50.8	
1978-01-08	51.0	
1978-01-05	51.4	
1978-01-03	52.3	
1978-01-01	53.3	
1977-12-30	53.9	
1977-12-28	54.5	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1977-12-27	54.8	
1977-12-25	55.3	
1977-12-23	56.0	
1977-12-21	56.7	
1977-12-19	60.4	
1977-12-17	63.7	
1977-12-15	68.0	
1977-12-13	71.6	
1977-12-11	72.0	
1977-12-09	71.8	
1977-12-06	71.9	
1977-12-04	72.4	
1977-11-30	72.7	
1977-11-28	71.5	
1977-11-26	71.3	
1977-11-24	71.5	
1977-11-17	71.5	
1977-11-15	71.3	
1977-11-13	70.3	
1977-11-11	69.1	
1977-11-09	68.5	
1977-11-06	68.3	
1977-11-04	67.5	
1977-11-02	66.4	
1977-10-31	65.3	
1977-10-29	63.8	
1977-10-27	63.5	
1977-10-25	63.8	
1977-10-23	64.4	
1977-10-21	65.0	
1977-10-19	65.3	
1977-10-17	65.3	
1977-10-15	65.1	
1977-10-13	64.9	
1977-10-11	65.2	
1977-10-09	65.6	
1977-10-07	66.5	
1977-10-05	67.1	
1977-10-03	67.9	
1977-10-01	68.8	
1977-09-29	69.5	
1977-09-27	70.3	
1977-09-25	71.7	
1977-09-23	75.3	
1977-09-21	77.0	
1977-09-19	78.0	
1977-09-17	78.7	
1977-09-15	79.8	
1977-09-13	82.5	
1977-09-11	86.0	
1977-09-09	88.4	
1977-09-07	89.9	
1977-09-05	92.5	
1977-09-03	97.6	
1977-09-01	100.1	
1977-12-26	55.0	
1977-12-24	55.7	
1977-12-22	56.4	
1977-12-20	59.0	
1977-12-18	61.7	
1977-12-16	65.6	
1977-12-14	70.7	
1977-12-12	71.9	
1977-12-10	71.7	
1977-12-07	71.7	
1977-12-05	72.1	
1977-12-03	72.5	
1977-11-29	71.6	
1977-11-27	71.4	
1977-11-25	71.4	
1977-11-20	71.6	
1977-11-16	71.4	
1977-11-14	71.0	
1977-11-12	70.0	
1977-11-10	68.6	
1977-11-08	68.4	
1977-11-05	68.1	
1977-11-03	67.1	
1977-11-01	66.0	
1977-10-30	64.4	
1977-10-28	63.6	
1977-10-26	63.6	
1977-10-24	64.2	
1977-10-22	64.6	
1977-10-20	65.2	
1977-10-18	65.4	
1977-10-16	65.2	
1977-10-14	65.0	
1977-10-12	65.0	
1977-10-10	65.4	
1977-10-08	66.2	
1977-10-06	66.7	
1977-10-04	67.4	
1977-10-02	68.3	
1977-09-30	69.3	
1977-09-28	69.7	
1977-09-26	71.0	
1977-09-24	74.0	
1977-09-22	76.2	
1977-09-20	77.5	
1977-09-18	78.3	
1977-09-16	79.1	
1977-09-14	81.3	
1977-09-12	84.3	
1977-09-10	87.7	
1977-09-08	89.1	
1977-09-06	91.0	
1977-09-04	95.0	
1977-09-02	99.0	
1977-07-29	98.0	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1977-07-28	97.8	
1977-07-26	96.7	
1977-07-24	94.6	
1977-07-22	93.7	
1977-07-20	93.0	
1977-07-18	92.3	
1977-07-16	91.3	
1977-07-14	90.0	
1977-07-12	88.1	
1977-07-10	84.8	
1977-07-08	83.7	
1977-07-06	84.0	
1977-07-04	88.6	
1977-07-02	90.4	
1977-06-30	91.7	
1977-06-27	92.0	
1977-06-25	91.6	
1977-06-23	90.2	
1977-06-21	88.7	
1977-06-19	86.5	
1977-06-17	83.8	
1977-06-15	82.0	
1977-06-13	80.3	
1977-06-11	78.7	
1977-06-09	76.7	
1977-06-07	72.3	
1977-06-05	69.2	
1977-06-03	67.7	
1977-06-01	67.0	
1977-05-30	66.3	
1977-05-28	65.5	
1977-05-20	65.3	
1977-05-18	66.5	
1977-05-16	69.0	
1977-05-14	72.4	
1977-05-12	76.5	
1977-05-10	78.1	
1977-05-08	79.6	
1977-05-06	79.6	
1977-05-04	78.5	
1977-04-30	77.6	
1977-04-28	76.7	
1977-04-26	77.2	
1977-04-24	76.0	
1977-04-22	73.6	
1977-04-20	71.9	
1977-04-18	73.2	
1977-04-16	74.5	
1977-04-14	75.3	
1977-04-12	76.4	
1977-04-10	77.3	
1977-04-08	76.5	
1977-04-06	76.0	
1977-04-04	75.2	
1977-04-02	75.0	
1977-07-27	97.0	
1977-07-25	95.7	
1977-07-23	94.1	
1977-07-21	93.2	
1977-07-19	93.1	
1977-07-17	92.0	
1977-07-15	90.8	
1977-07-13	88.7	
1977-07-11	86.2	
1977-07-09	83.9	
1977-07-07	83.4	
1977-07-05	85.0	
1977-07-03	89.5	
1977-07-01	91.2	
1977-06-28	91.9	
1977-06-26	91.9	
1977-06-24	90.8	
1977-06-22	89.3	
1977-06-20	87.6	
1977-06-18	85.0	
1977-06-16	82.9	
1977-06-14	80.4	
1977-06-12	79.3	
1977-06-10	78.3	
1977-06-08	74.5	
1977-06-06	70.3	
1977-06-04	68.5	
1977-06-02	67.2	
1977-05-31	66.7	
1977-05-29	65.8	
1977-05-27	65.4	
1977-05-19	65.9	
1977-05-17	67.7	
1977-05-15	70.5	
1977-05-13	74.7	
1977-05-11	77.3	
1977-05-09	78.7	
1977-05-07	80.1	
1977-05-05	78.8	
1977-05-01	78.4	
1977-04-29	77.1	
1977-04-27	76.8	
1977-04-25	76.7	
1977-04-23	75.1	
1977-04-21	72.3	
1977-04-19	72.7	
1977-04-17	74.0	
1977-04-15	74.7	
1977-04-13	75.7	
1977-04-11	76.8	
1977-04-09	77.0	
1977-04-07	76.4	
1977-04-05	75.3	
1977-04-03	75.1	
1977-03-31	75.1	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1977-03-30	75.2	
1977-03-28	73.7	
1977-03-26	74.5	
1977-03-24	74.7	
1977-03-22	76.7	
1977-03-20	81.6	
1977-03-18	84.5	
1977-03-16	84.8	
1977-03-14	85.7	
1977-03-12	86.2	
1977-03-10	86.0	
1977-03-08	84.7	
1977-03-06	83.5	
1977-03-04	82.8	
1977-03-02	81.7	
1977-02-28	80.1	
1977-02-26	78.9	
1977-02-24	77.8	
1977-02-22	75.9	
1977-02-20	73.7	
1977-02-18	69.6	
1977-02-16	64.8	
1977-02-14	61.9	
1977-02-12	57.9	
1977-02-10	55.7	
1977-02-08	52.6	
1977-02-06	50.0	
1977-02-04	47.0	
1977-02-02	45.9	
1977-01-31	44.9	
1977-01-29	44.2	
1977-01-27	43.8	
1977-01-25	43.6	
1977-01-23	43.4	
1977-01-21	43.2	
1977-01-19	43.3	
1977-01-11	43.3	
1976-12-31	45.7	
1976-12-25	45.4	
1976-12-18	45.7	
1976-12-12	46.0	
1976-12-01	46.3	
1976-11-29	46.6	
1976-11-27	47.1	
1976-11-25	47.4	
1976-11-23	47.7	
1976-11-21	48.0	
1976-11-19	48.3	
1976-11-17	48.7	
1976-11-15	49.0	
1976-11-13	48.8	
1976-11-10	48.6	
1976-11-04	48.6	
1976-11-02	48.8	
1976-10-31	49.0	

Date	Feet below Surface	Feet to Sealevel
1977-03-29	75.1	
1977-03-27	74.3	
1977-03-25	74.6	
1977-03-23	74.9	
1977-03-21	79.3	
1977-03-19	83.1	
1977-03-17	84.7	
1977-03-15	84.9	
1977-03-13	86.3	
1977-03-11	86.1	
1977-03-09	85.4	
1977-03-07	83.7	
1977-03-05	83.4	
1977-03-03	82.1	
1977-03-01	80.7	
1977-02-27	79.7	
1977-02-25	78.0	
1977-02-23	77.4	
1977-02-21	74.5	
1977-02-19	71.9	
1977-02-17	67.3	
1977-02-15	62.8	
1977-02-13	60.0	
1977-02-11	56.7	
1977-02-09	54.4	
1977-02-07	51.7	
1977-02-05	48.7	
1977-02-03	46.5	
1977-02-01	45.7	
1977-01-30	44.5	
1977-01-28	43.9	
1977-01-26	43.7	
1977-01-24	43.5	
1977-01-22	43.3	
1977-01-20	43.1	
1977-01-12	43.4	
1977-01-01	45.7	
1976-12-29	45.5	
1976-12-20	45.5	
1976-12-15	45.9	
1976-12-10	46.2	
1976-11-30	46.4	
1976-11-28	46.9	
1976-11-26	47.3	
1976-11-24	47.5	
1976-11-22	47.9	
1976-11-20	48.1	
1976-11-18	48.5	
1976-11-16	48.9	
1976-11-14	48.9	
1976-11-11	48.7	
1976-11-05	48.5	
1976-11-03	48.7	
1976-11-01	48.9	
1976-10-30	49.1	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1976-10-29	49.2	
1976-10-27	49.4	
1976-10-25	49.6	
1976-10-23	49.9	
1976-10-21	50.4	
1976-10-19	51.0	
1976-10-17	51.4	
1976-10-15	52.3	
1976-10-13	53.3	
1976-10-11	54.7	
1976-10-09	56.7	
1976-10-07	58.6	
1976-10-05	60.0	
1976-10-03	63.3	
1976-10-01	66.2	
1976-09-29	68.6	
1976-09-27	69.3	
1976-09-25	69.9	
1976-09-23	72.0	
1976-09-21	72.0	
1976-09-19	73.1	
1976-09-17	75.2	
1976-09-15	78.6	
1976-09-13	83.5	
1976-09-11	86.3	
1976-09-09	86.6	
1976-09-07	88.7	
1976-09-05	88.9	
1976-09-03	87.4	
1976-09-01	87.9	
1976-08-30	88.0	
1976-08-28	87.9	
1976-08-26	87.3	
1976-08-23	87.3	
1976-08-21	90.8	
1976-08-19	93.3	
1976-08-17	93.9	
1976-08-15	93.7	
1976-08-13	92.9	
1976-08-11	94.2	
1976-08-09	95.1	
1976-08-07	95.3	
1976-08-05	95.6	
1976-08-03	96.1	
1976-08-01	95.8	
1976-07-30	95.4	
1976-07-28	95.4	
1976-07-25	95.6	
1976-07-23	95.6	
1976-07-21	95.2	
1976-07-19	94.2	
1976-07-17	93.1	
1976-07-15	91.3	
1976-07-13	90.4	
1976-07-11	90.4	
1976-10-28	49.3	
1976-10-26	49.5	
1976-10-24	49.7	
1976-10-22	50.1	
1976-10-20	50.5	
1976-10-18	51.2	
1976-10-16	51.9	
1976-10-14	52.7	
1976-10-12	54.1	
1976-10-10	55.0	
1976-10-08	57.6	
1976-10-06	59.4	
1976-10-04	61.9	
1976-10-02	64.8	
1976-09-30	67.2	
1976-09-28	69.2	
1976-09-26	69.4	
1976-09-24	71.3	
1976-09-22	72.1	
1976-09-20	72.2	
1976-09-18	74.1	
1976-09-16	76.7	
1976-09-14	80.9	
1976-09-12	85.9	
1976-09-10	86.4	
1976-09-08	87.3	
1976-09-06	89.1	
1976-09-04	88.3	
1976-09-02	87.6	
1976-08-31	87.9	
1976-08-29	88.2	
1976-08-27	87.5	
1976-08-25	87.2	
1976-08-22	89.7	
1976-08-20	92.3	
1976-08-18	93.8	
1976-08-16	94.0	
1976-08-14	93.3	
1976-08-12	93.2	
1976-08-10	94.7	
1976-08-08	95.2	
1976-08-06	95.4	
1976-08-04	95.8	
1976-08-02	96.2	
1976-07-31	95.5	
1976-07-29	95.3	
1976-07-26	95.5	
1976-07-24	95.7	
1976-07-22	95.4	
1976-07-20	94.8	
1976-07-18	93.6	
1976-07-16	92.3	
1976-07-14	90.7	
1976-07-12	90.3	
1976-07-10	90.2	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1976-07-09	90.0	
1976-07-07	89.2	
1976-07-05	86.5	
1976-07-03	85.2	
1976-07-01	83.7	
1976-06-29	83.7	
1976-06-27	84.1	
1976-06-25	83.5	
1976-06-23	83.5	
1976-06-21	84.7	
1976-06-19	84.7	
1976-06-17	83.7	
1976-06-15	83.0	
1976-06-13	81.5	
1976-06-11	78.6	
1976-06-09	75.9	
1976-06-07	75.4	
1976-06-05	73.8	
1976-06-03	71.7	
1976-06-01	71.3	
1976-05-30	71.6	
1976-05-28	71.8	
1976-05-26	72.5	
1976-05-24	75.7	
1976-05-22	79.3	
1976-05-20	79.8	
1976-05-18	78.7	
1976-05-16	77.3	
1976-05-14	74.9	
1976-05-12	72.5	
1976-05-10	69.7	
1976-05-08	69.2	
1976-05-06	69.2	
1976-05-04	67.8	
1976-05-02	65.7	
1976-04-30	63.7	
1976-04-28	62.3	
1976-04-26	60.4	
1976-04-24	59.4	
1976-04-22	57.8	
1976-04-20	57.5	
1976-04-18	57.5	
1976-04-16	58.0	
1976-04-14	61.7	
1976-04-12	64.3	
1976-04-10	67.2	
1976-04-08	69.7	
1976-04-06	70.8	
1976-04-04	75.0	
1976-04-02	76.6	
1976-03-31	77.2	
1976-03-29	76.9	
1976-03-27	76.2	
1976-03-25	74.3	
1976-03-23	71.0	
1976-07-08	89.7	
1976-07-06	87.2	
1976-07-04	86.2	
1976-07-02	84.4	
1976-06-30	83.6	
1976-06-28	83.8	
1976-06-26	83.9	
1976-06-24	83.2	
1976-06-22	84.1	
1976-06-20	84.8	
1976-06-18	84.0	
1976-06-16	83.6	
1976-06-14	82.7	
1976-06-12	80.4	
1976-06-10	77.0	
1976-06-08	75.6	
1976-06-06	75.2	
1976-06-04	72.3	
1976-06-02	71.2	
1976-05-31	71.5	
1976-05-29	71.7	
1976-05-27	72.2	
1976-05-25	74.4	
1976-05-23	77.7	
1976-05-21	79.9	
1976-05-19	79.5	
1976-05-17	77.8	
1976-05-15	76.7	
1976-05-13	73.7	
1976-05-11	70.7	
1976-05-09	69.4	
1976-05-07	69.1	
1976-05-05	68.5	
1976-05-03	66.7	
1976-05-01	64.4	
1976-04-29	63.4	
1976-04-27	61.0	
1976-04-25	60.1	
1976-04-23	58.7	
1976-04-21	57.4	
1976-04-19	57.6	
1976-04-17	57.6	
1976-04-15	59.2	
1976-04-13	62.8	
1976-04-11	65.7	
1976-04-09	68.4	
1976-04-07	70.1	
1976-04-05	72.1	
1976-04-03	75.7	
1976-04-01	77.1	
1976-03-30	77.1	
1976-03-28	76.5	
1976-03-26	75.0	
1976-03-24	72.3	
1976-03-22	70.2	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1976-03-21	66.5	
1976-03-19	61.4	
1976-03-17	58.1	
1976-03-15	57.0	
1976-03-13	57.0	
1976-03-10	56.5	
1976-03-08	56.3	
1976-03-06	58.2	
1976-03-04	60.2	
1976-03-02	61.2	
1976-02-29	63.0	
1976-02-27	65.2	
1976-02-25	67.5	
1976-02-23	68.7	
1976-02-20	68.9	
1976-02-18	69.2	
1976-02-16	69.9	
1976-02-14	70.2	
1976-02-12	70.4	
1976-02-10	70.4	
1976-02-08	70.0	
1976-02-06	70.2	
1976-02-04	69.6	
1976-02-02	67.9	
1976-01-31	64.9	
1976-01-29	61.5	
1976-01-27	59.4	
1976-01-25	57.5	
1976-01-23	55.4	
1976-01-21	54.8	
1976-01-19	54.6	
1976-01-16	54.8	
1976-01-14	54.3	
1976-01-12	54.0	
1976-01-10	53.1	
1976-01-08	52.7	
1976-01-06	51.2	
1976-01-04	48.3	
1976-01-02	47.0	
1975-12-31	44.4	
1975-12-29	44.0	
1975-12-27	43.6	
1975-12-25	43.3	
1975-12-23	42.8	
1975-12-18	42.8	
1975-12-15	43.0	
1975-12-13	43.4	
1975-12-10	43.5	
1975-12-06	43.4	
1975-12-04	43.6	
1975-12-01	43.8	
1975-11-29	44.7	
1975-11-27	45.0	
1975-11-25	45.8	
1975-11-23	46.3	

Date	Feet below Surface	Feet to Sealevel
1976-03-20	64.2	
1976-03-18	58.5	
1976-03-16	57.6	
1976-03-14	57.1	
1976-03-12	56.4	
1976-03-09	56.4	
1976-03-07	56.2	
1976-03-05	59.2	
1976-03-03	60.9	
1976-03-01	62.2	
1976-02-28	64.3	
1976-02-26	66.2	
1976-02-24	68.2	
1976-02-22	68.8	
1976-02-19	69.0	
1976-02-17	69.4	
1976-02-15	70.1	
1976-02-13	70.3	
1976-02-11	70.5	
1976-02-09	70.2	
1976-02-07	70.1	
1976-02-05	70.1	
1976-02-03	69.3	
1976-02-01	66.9	
1976-01-30	62.8	
1976-01-28	60.6	
1976-01-26	58.6	
1976-01-24	56.6	
1976-01-22	55.1	
1976-01-20	54.7	
1976-01-17	54.7	
1976-01-15	54.4	
1976-01-13	54.4	
1976-01-11	53.3	
1976-01-09	53.0	
1976-01-07	52.1	
1976-01-05	49.1	
1976-01-03	47.4	
1976-01-01	44.8	
1975-12-30	44.2	
1975-12-28	43.7	
1975-12-26	43.5	
1975-12-24	43.1	
1975-12-22	42.7	
1975-12-16	42.9	
1975-12-14	43.2	
1975-12-11	43.6	
1975-12-07	43.3	
1975-12-05	43.5	
1975-12-03	43.7	
1975-11-30	44.6	
1975-11-28	44.8	
1975-11-26	45.6	
1975-11-24	46.0	
1975-11-22	47.3	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1975-11-21	47.8	
1975-11-19	49.1	
1975-11-17	50.7	
1975-11-15	51.7	
1975-11-13	52.6	
1975-11-11	54.4	
1975-11-09	54.8	
1975-11-07	55.6	
1975-11-05	56.5	
1975-11-03	57.4	
1975-11-01	57.9	
1975-10-30	58.1	
1975-10-28	58.4	
1975-10-26	60.9	
1975-10-24	64.3	
1975-10-22	66.8	
1975-10-20	68.9	
1975-10-18	71.2	
1975-10-16	72.5	
1975-10-14	72.9	
1975-10-12	72.5	
1975-10-10	72.0	
1975-10-08	72.2	
1975-10-05	72.0	
1975-10-02	72.8	
1975-09-30	74.4	
1975-09-28	76.0	
1975-09-26	76.2	
1975-09-24	78.0	
1975-09-22	81.1	
1975-09-20	83.1	
1975-09-18	83.8	
1975-09-16	85.3	
1975-09-14	86.9	
1975-09-11	86.9	
1975-09-09	86.0	
1975-09-07	84.8	
1975-09-05	84.7	
1975-09-03	85.9	
1975-09-01	86.8	
1975-08-25	86.9	
1975-08-23	88.6	
1975-08-21	91.4	
1975-08-19	93.0	
1975-08-17	93.0	
1975-08-15	91.9	
1975-08-13	91.7	
1975-08-11	90.7	
1975-08-09	89.8	
1975-08-07	88.3	
1975-08-05	84.6	
1975-08-01	84.0	
1975-07-30	84.0	
1975-07-28	83.8	
1975-07-26	84.4	
1975-11-20	48.3	
1975-11-18	49.7	
1975-11-16	51.4	
1975-11-14	51.9	
1975-11-12	52.9	
1975-11-10	54.6	
1975-11-08	54.9	
1975-11-06	56.0	
1975-11-04	56.7	
1975-11-02	57.7	
1975-10-31	58.0	
1975-10-29	58.2	
1975-10-27	59.7	
1975-10-25	62.4	
1975-10-23	65.7	
1975-10-21	67.8	
1975-10-19	70.4	
1975-10-17	71.7	
1975-10-15	72.8	
1975-10-13	72.7	
1975-10-11	72.1	
1975-10-09	72.1	
1975-10-07	72.1	
1975-10-03	71.9	
1975-10-01	73.6	
1975-09-29	75.4	
1975-09-27	76.1	
1975-09-25	76.7	
1975-09-23	79.8	
1975-09-21	82.7	
1975-09-19	83.3	
1975-09-17	84.4	
1975-09-15	86.5	
1975-09-12	86.8	
1975-09-10	87.0	
1975-09-08	85.5	
1975-09-06	84.6	
1975-09-04	84.9	
1975-09-02	86.6	
1975-08-29	86.8	
1975-08-24	87.8	
1975-08-22	90.0	
1975-08-20	92.9	
1975-08-18	93.2	
1975-08-16	92.6	
1975-08-14	91.8	
1975-08-12	91.4	
1975-08-10	90.1	
1975-08-08	89.5	
1975-08-06	86.2	
1975-08-04	84.1	
1975-07-31	84.1	
1975-07-29	83.6	
1975-07-27	84.1	
1975-07-25	84.3	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1975-07-24	84.2	
1975-07-22	84.1	
1975-07-20	84.3	
1975-07-18	83.0	
1975-07-16	82.7	
1975-07-14	81.9	
1975-07-12	81.2	
1975-07-10	80.9	
1975-07-08	80.6	
1975-07-06	79.0	
1975-07-04	78.5	
1975-07-02	79.1	
1975-06-30	79.4	
1975-06-28	79.1	
1975-06-26	79.8	
1975-06-24	81.1	
1975-06-20	81.4	
1975-06-18	81.7	
1975-06-16	80.0	
1975-06-14	79.5	
1975-06-12	77.0	
1975-06-10	74.0	
1975-06-08	73.8	
1975-06-06	73.1	
1975-06-03	72.9	
1975-06-01	71.2	
1975-05-30	70.9	
1975-05-28	72.6	
1975-05-26	73.1	
1975-05-24	72.8	
1975-05-22	73.7	
1975-05-20	74.7	
1975-05-18	74.9	
1975-05-16	73.9	
1975-05-14	72.2	
1975-05-12	72.3	
1975-05-10	73.1	
1975-05-08	72.5	
1975-05-06	72.6	
1975-05-04	71.9	
1975-05-02	68.9	
1975-04-30	66.9	
1975-04-28	65.1	
1975-04-26	63.9	
1975-04-24	63.8	
1975-04-22	65.0	
1975-04-20	66.9	
1975-04-18	69.0	
1975-04-16	70.0	
1975-04-14	70.2	
1975-04-12	70.2	
1975-04-10	69.0	
1975-04-08	67.3	
1975-04-06	65.1	
1975-04-04	60.7	

Date	Feet below Surface	Feet to Sealevel
1975-07-23	84.0	
1975-07-21	84.4	
1975-07-19	83.8	
1975-07-17	83.0	
1975-07-15	82.2	
1975-07-13	81.6	
1975-07-11	81.0	
1975-07-09	80.8	
1975-07-07	80.0	
1975-07-05	78.4	
1975-07-03	78.7	
1975-07-01	79.5	
1975-06-29	78.9	
1975-06-27	79.0	
1975-06-25	80.3	
1975-06-23	81.3	
1975-06-19	81.5	
1975-06-17	80.9	
1975-06-15	79.8	
1975-06-13	78.9	
1975-06-11	75.1	
1975-06-09	73.2	
1975-06-07	74.0	
1975-06-05	73.0	
1975-06-02	72.4	
1975-05-31	70.8	
1975-05-29	71.5	
1975-05-27	73.0	
1975-05-25	72.9	
1975-05-23	73.2	
1975-05-21	74.3	
1975-05-19	74.8	
1975-05-17	74.6	
1975-05-15	72.9	
1975-05-13	72.1	
1975-05-11	72.8	
1975-05-09	73.0	
1975-05-07	72.4	
1975-05-05	72.9	
1975-05-03	70.3	
1975-05-01	67.8	
1975-04-29	65.9	
1975-04-27	64.9	
1975-04-25	63.7	
1975-04-23	64.4	
1975-04-21	65.9	
1975-04-19	67.9	
1975-04-17	69.7	
1975-04-15	70.1	
1975-04-13	70.3	
1975-04-11	69.8	
1975-04-09	68.2	
1975-04-07	66.4	
1975-04-05	63.2	
1975-04-03	59.2	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1975-04-02	57.4	
1975-03-31	57.1	
1975-03-28	57.3	
1975-03-26	57.6	
1975-03-24	59.2	
1975-03-22	61.8	
1975-03-20	64.8	
1975-03-18	67.5	
1975-03-16	71.2	
1975-03-14	73.1	
1975-03-12	73.2	
1975-03-10	73.0	
1975-03-08	71.7	
1975-03-06	69.6	
1975-03-04	66.2	
1975-03-02	63.6	
1975-02-28	62.3	
1975-02-26	62.2	
1975-02-24	63.8	
1975-02-22	64.1	
1975-02-18	64.0	
1975-02-16	64.2	
1975-02-14	63.5	
1975-02-12	63.1	
1975-02-09	62.9	
1975-02-05	62.3	
1975-02-03	62.3	
1975-02-01	61.2	
1975-01-30	57.9	
1975-01-28	55.0	
1975-01-26	51.7	
1975-01-24	49.2	
1975-01-22	46.8	
1975-01-20	45.4	
1975-01-18	43.5	
1975-01-16	41.2	
1975-01-14	40.4	
1975-01-11	40.0	
1975-01-09	39.8	
1975-01-05	39.5	
1975-01-01	39.3	
1974-12-30	38.9	
1974-12-28	38.8	
1974-12-26	38.6	
1974-12-24	38.6	
1974-12-21	39.3	
1974-12-18	39.6	
1974-12-16	40.8	
1974-12-14	41.2	
1974-12-12	41.5	
1974-12-10	42.1	
1974-12-08	42.7	
1974-12-04	43.3	
1974-12-02	44.1	
1974-11-30	44.3	
1975-04-01	56.9	
1975-03-29	57.2	
1975-03-27	57.5	
1975-03-25	58.5	
1975-03-23	60.3	
1975-03-21	63.4	
1975-03-19	66.2	
1975-03-17	69.2	
1975-03-15	72.3	
1975-03-13	73.0	
1975-03-11	73.3	
1975-03-09	72.6	
1975-03-07	71.3	
1975-03-05	67.8	
1975-03-03	64.5	
1975-03-01	63.3	
1975-02-27	62.0	
1975-02-25	63.0	
1975-02-23	64.0	
1975-02-21	64.2	
1975-02-17	64.1	
1975-02-15	64.1	
1975-02-13	63.2	
1975-02-11	63.0	
1975-02-08	62.2	
1975-02-04	62.4	
1975-02-02	61.9	
1975-01-31	58.7	
1975-01-29	56.9	
1975-01-27	53.4	
1975-01-25	50.3	
1975-01-23	48.0	
1975-01-21	46.2	
1975-01-19	44.7	
1975-01-17	42.3	
1975-01-15	40.5	
1975-01-12	40.3	
1975-01-10	39.9	
1975-01-08	39.4	
1975-01-04	39.4	
1974-12-31	39.0	
1974-12-29	39.0	
1974-12-27	38.7	
1974-12-25	38.7	
1974-12-23	38.8	
1974-12-19	39.5	
1974-12-17	40.3	
1974-12-15	41.1	
1974-12-13	41.4	
1974-12-11	42.0	
1974-12-09	42.4	
1974-12-07	43.2	
1974-12-03	44.0	
1974-12-01	44.2	
1974-11-27	44.4	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1974-11-23	44.5	
1974-11-21	44.5	
1974-11-18	45.2	
1974-11-15	45.6	
1974-11-13	46.4	
1974-11-11	47.2	
1974-11-09	48.1	
1974-11-07	49.2	
1974-11-05	50.3	
1974-11-03	51.0	
1974-11-01	51.9	
1974-10-30	52.4	
1974-10-28	52.7	
1974-10-26	53.5	
1974-10-24	53.5	
1974-10-21	53.5	
1974-10-15	53.5	
1974-10-13	53.4	
1974-10-11	54.9	
1974-10-09	56.4	
1974-10-07	58.0	
1974-10-05	59.6	
1974-10-03	61.5	
1974-10-01	62.2	
1974-09-29	62.7	
1974-09-27	62.1	
1974-09-23	61.8	
1974-09-21	63.2	
1974-09-19	65.8	
1974-09-17	68.3	
1974-09-15	71.3	
1974-09-13	73.6	
1974-09-11	75.3	
1974-09-09	75.7	
1974-09-07	78.6	
1974-09-05	81.0	
1974-09-03	85.3	
1974-09-01	86.4	
1974-08-30	86.2	
1974-08-28	86.5	
1974-08-26	87.9	
1974-08-23	88.6	
1974-08-21	90.0	
1974-08-19	92.1	
1974-08-16	92.3	
1974-08-13	92.4	
1974-08-11	93.3	
1974-08-09	93.6	
1974-08-06	93.3	
1974-08-04	92.9	
1974-08-02	91.1	
1974-07-31	89.5	
1974-07-29	89.0	
1974-07-27	89.4	
1974-07-25	88.1	

Date	Feet below Surface	Feet to Sealevel
1974-11-22	44.6	
1974-11-20	44.9	
1974-11-17	45.4	
1974-11-14	46.2	
1974-11-12	47.0	
1974-11-10	47.6	
1974-11-08	48.8	
1974-11-06	49.9	
1974-11-04	50.6	
1974-11-02	51.5	
1974-10-31	52.2	
1974-10-29	52.6	
1974-10-27	53.1	
1974-10-25	53.6	
1974-10-22	53.3	
1974-10-16	53.6	
1974-10-14	53.3	
1974-10-12	54.2	
1974-10-10	55.7	
1974-10-08	57.3	
1974-10-06	58.9	
1974-10-04	60.6	
1974-10-02	62.0	
1974-09-30	62.6	
1974-09-28	62.4	
1974-09-24	61.6	
1974-09-22	62.7	
1974-09-20	64.4	
1974-09-18	66.6	
1974-09-16	69.9	
1974-09-14	72.3	
1974-09-12	75.1	
1974-09-10	75.6	
1974-09-08	77.3	
1974-09-06	79.5	
1974-09-04	82.9	
1974-09-02	86.5	
1974-08-31	86.3	
1974-08-29	86.3	
1974-08-27	87.0	
1974-08-25	88.5	
1974-08-22	88.4	
1974-08-20	91.2	
1974-08-17	92.2	
1974-08-14	92.2	
1974-08-12	92.7	
1974-08-10	93.5	
1974-08-07	93.5	
1974-08-05	3.0	
1974-08-03	92.2	
1974-08-01	90.1	
1974-07-30	89.1	
1974-07-28	89.9	
1974-07-26	88.8	
1974-07-24	87.4	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1974-07-23	85.6	
1974-07-21	85.6	
1974-07-19	84.6	
1974-07-17	84.2	
1974-07-15	84.1	
1974-07-13	84.2	
1974-07-11	85.4	
1974-07-09	85.4	
1974-07-07	83.6	
1974-07-05	81.5	
1974-07-03	80.7	
1974-07-01	79.7	
1974-06-29	81.2	
1974-06-27	81.6	
1974-05-28	62.9	
1974-05-26	63.8	
1974-05-24	64.7	
1974-05-22	65.6	
1974-05-20	66.0	
1974-05-18	65.9	
1974-05-16	66.5	
1974-05-14	66.8	
1974-05-12	67.0	
1974-05-10	66.4	
1974-05-08	63.8	
1974-05-06	63.9	
1974-05-04	63.1	
1974-05-02	62.2	
1974-04-30	62.0	
1974-04-28	61.0	
1974-04-26	59.4	
1974-04-24	57.1	
1974-04-22	56.4	
1974-04-20	56.1	
1974-04-18	53.9	
1974-04-16	52.9	
1974-04-13	53.1	
1974-04-11	52.9	
1974-04-09	52.2	
1974-04-07	53.1	
1974-04-05	55.5	
1974-03-05	76.4	
1974-03-03	78.7	
1974-03-01	76.5	
1974-02-27	72.4	
1974-02-25	69.3	
1974-02-23	64.6	
1974-02-21	59.5	
1974-02-19	54.7	
1974-02-17	50.3	
1974-02-15	46.8	
1974-02-13	44.0	
1974-02-11	42.2	
1974-02-09	39.6	
1974-02-07	38.0	

Date	Feet below Surface	Feet to Sealevel
1974-07-22	85.7	
1974-07-20	85.5	
1974-07-18	83.9	
1974-07-16	84.3	
1974-07-14	84.0	
1974-07-12	85.1	
1974-07-10	85.7	
1974-07-08	84.6	
1974-07-06	82.4	
1974-07-04	81.3	
1974-07-02	80.4	
1974-06-30	80.6	
1974-06-28	81.5	
1974-05-29	64.1	
1974-05-27	63.1	
1974-05-25	64.6	
1974-05-23	65.2	
1974-05-21	66.1	
1974-05-19	65.7	
1974-05-17	66.3	
1974-05-15	66.7	
1974-05-13	66.9	
1974-05-11	66.8	
1974-05-09	65.6	
1974-05-07	63.7	
1974-05-05	63.6	
1974-05-03	62.5	
1974-05-01	62.1	
1974-04-29	61.8	
1974-04-27	60.2	
1974-04-25	58.3	
1974-04-23	56.5	
1974-04-21	56.3	
1974-04-19	55.6	
1974-04-17	53.1	
1974-04-15	53.0	
1974-04-12	53.2	
1974-04-10	52.6	
1974-04-08	52.3	
1974-04-06	54.1	
1974-04-04	56.2	
1974-03-04	77.6	
1974-03-02	77.2	
1974-02-28	75.3	
1974-02-26	71.3	
1974-02-24	67.3	
1974-02-22	62.1	
1974-02-20	57.2	
1974-02-18	52.4	
1974-02-16	48.3	
1974-02-14	45.3	
1974-02-12	43.1	
1974-02-10	41.3	
1974-02-08	38.2	
1974-02-06	37.1	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1974-02-05	36.7	
1974-02-03	36.1	
1974-02-01	35.7	
1974-01-27	35.8	
1974-01-20	36.1	
1974-01-18	35.9	
1974-01-16	36.1	
1974-01-14	36.3	
1974-01-08	38.2	
1974-01-03	38.3	
1973-12-31	38.4	
1973-12-23	38.6	
1973-12-18	38.8	
1973-12-16	39.2	
1973-12-14	39.4	
1973-12-12	41.4	
1973-12-10	42.1	
1973-12-08	42.7	
1973-12-01	42.9	
1973-11-29	43.3	
1973-11-26	43.6	
1973-11-22	43.6	
1973-11-18	43.4	
1973-11-15	43.6	
1973-11-12	43.8	
1973-11-10	44.9	
1973-11-08	45.1	
1973-11-06	45.5	
1973-11-04	45.8	
1973-11-02	46.2	
1973-10-31	46.6	
1973-10-29	47.4	
1973-10-27	47.8	
1973-10-25	48.6	
1973-10-23	49.4	
1973-10-21	50.4	
1973-10-19	51.4	
1973-10-17	52.0	
1973-10-15	54.1	
1973-10-13	55.0	
1973-10-11	57.1	
1973-10-09	59.3	
1973-10-07	61.0	
1973-10-05	61.5	
1973-10-03	62.3	
1973-10-01	62.3	
1973-09-29	62.8	
1973-09-27	63.5	
1973-09-25	64.7	
1973-09-23	66.2	
1973-09-21	68.2	
1973-09-19	70.1	
1973-09-17	74.5	
1973-09-15	78.6	
1973-09-13	80.0	
1974-02-04	36.4	
1974-02-02	35.8	
1974-01-29	35.7	
1974-01-25	36.0	
1974-01-19	36.0	
1974-01-17	36.0	
1974-01-15	36.2	
1974-01-09	36.4	
1974-01-07	38.4	
1974-01-01	38.4	
1973-12-28	38.5	
1973-12-19	38.7	
1973-12-17	39.1	
1973-12-15	39.3	
1973-12-13	39.5	
1973-12-11	41.7	
1973-12-09	42.5	
1973-12-07	42.8	
1973-11-30	43.1	
1973-11-28	43.4	
1973-11-24	43.7	
1973-11-21	43.5	
1973-11-16	43.5	
1973-11-14	43.7	
1973-11-11	44.8	
1973-11-09	45.0	
1973-11-07	45.2	
1973-11-05	45.6	
1973-11-03	45.9	
1973-11-01	46.5	
1973-10-30	47.0	
1973-10-28	47.5	
1973-10-26	48.0	
1973-10-24	49.1	
1973-10-22	49.9	
1973-10-20	50.6	
1973-10-18	51.8	
1973-10-16	53.5	
1973-10-14	54.6	
1973-10-12	55.4	
1973-10-10	57.6	
1973-10-08	60.3	
1973-10-06	61.1	
1973-10-04	62.2	
1973-10-02	62.4	
1973-09-30	62.5	
1973-09-28	63.1	
1973-09-26	64.0	
1973-09-24	65.2	
1973-09-22	67.0	
1973-09-20	69.1	
1973-09-18	71.1	
1973-09-16	76.4	
1973-09-14	79.3	
1973-09-12	81.1	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1973-09-11	81.6	
1973-09-09	82.9	
1973-09-07	85.0	
1973-09-05	87.3	
1973-09-03	88.1	
1973-09-01	89.4	
1973-08-30	90.1	
1973-08-28	90.5	
1973-08-26	89.3	
1973-08-24	90.5	
1973-08-22	90.2	
1973-08-20	88.1	
1973-08-18	87.7	
1973-08-16	87.2	
1973-08-14	86.6	
1973-08-12	85.5	
1973-08-10	85.2	
1973-08-08	85.4	
1973-08-06	86.6	
1973-08-04	87.1	
1973-08-02	88.6	
1973-07-31	88.2	
1973-07-29	86.8	
1973-07-27	86.9	
1973-07-25	87.8	
1973-07-23	86.2	
1973-07-21	85.5	
1973-07-19	85.8	
1973-07-17	85.4	
1973-07-15	85.0	
1973-07-13	84.5	
1973-07-11	83.4	
1973-07-09	81.3	
1973-07-07	80.7	
1973-07-05	80.0	
1973-07-03	80.2	
1973-07-01	81.5	
1973-06-29	81.3	
1973-06-27	80.3	
1973-06-25	77.8	
1973-06-23	75.9	
1973-06-21	73.6	
1973-06-19	72.5	
1973-06-17	72.3	
1973-06-15	73.6	
1973-06-13	73.0	
1973-06-11	72.6	
1973-06-09	70.9	
1973-06-07	69.9	
1973-06-05	69.4	
1973-06-03	68.9	
1973-06-01	68.7	
1973-05-30	70.6	
1973-05-28	71.0	
1973-05-26	70.5	
1973-09-10	82.3	
1973-09-08	83.7	
1973-09-06	86.1	
1973-09-04	87.9	
1973-09-02	88.9	
1973-08-31	89.8	
1973-08-29	90.6	
1973-08-27	90.0	
1973-08-25	89.7	
1973-08-23	90.6	
1973-08-21	89.1	
1973-08-19	87.8	
1973-08-17	87.5	
1973-08-15	87.1	
1973-08-13	85.9	
1973-08-11	84.9	
1973-08-09	85.3	
1973-08-07	85.9	
1973-08-05	86.9	
1973-08-03	87.4	
1973-08-01	88.7	
1973-07-30	87.2	
1973-07-28	86.7	
1973-07-26	87.9	
1973-07-24	86.4	
1973-07-22	85.6	
1973-07-20	85.6	
1973-07-18	85.7	
1973-07-16	85.3	
1973-07-14	84.9	
1973-07-12	84.2	
1973-07-10	82.1	
1973-07-08	81.2	
1973-07-06	80.5	
1973-07-04	80.1	
1973-07-02	80.5	
1973-06-30	81.8	
1973-06-28	80.5	
1973-06-26	79.7	
1973-06-24	76.9	
1973-06-22	75.0	
1973-06-20	72.8	
1973-06-18	72.4	
1973-06-16	72.8	
1973-06-14	73.3	
1973-06-12	72.8	
1973-06-10	71.6	
1973-06-08	70.4	
1973-06-06	69.3	
1973-06-04	69.5	
1973-06-02	68.5	
1973-05-31	69.0	
1973-05-29	70.9	
1973-05-27	70.6	
1973-05-25	70.4	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1973-05-24	70.3	
1973-05-22	70.7	
1973-05-20	72.2	
1973-05-18	73.3	
1973-05-16	76.1	
1973-05-14	77.8	
1973-05-12	79.3	
1973-05-10	79.1	
1973-05-08	78.5	
1973-05-06	75.0	
1973-05-04	73.3	
1973-05-02	70.3	
1973-04-04	39.5	
1973-04-02	39.1	
1973-03-31	37.3	
1973-03-27	37.3	
1973-03-25	37.5	
1973-03-23	37.5	
1973-03-21	37.1	
1973-03-19	36.1	
1973-03-17	35.6	
1973-03-15	35.9	
1973-03-13	36.1	
1973-03-11	36.4	
1973-03-09	36.7	
1973-03-07	36.5	
1973-03-01	35.4	
1973-02-25	35.5	
1973-02-19	35.7	
1973-02-16	35.7	
1973-02-14	35.9	
1973-02-12	36.2	
1973-02-08	36.1	
1973-01-31	37.5	
1973-01-29	37.5	
1973-01-25	37.7	
1973-01-14	37.7	
1973-01-11	37.9	
1973-01-08	39.5	
1973-01-04	39.9	
1973-01-02	40.0	
1972-12-31	40.3	
1972-12-28	40.5	
1972-12-24	41.1	
1972-12-20	40.9	
1972-12-18	40.9	
1972-12-13	43.1	
1972-12-07	43.1	
1972-12-03	42.9	
1972-11-29	42.9	
1972-11-26	43.2	
1972-11-24	43.4	
1972-11-22	43.6	
1972-11-20	44.1	
1972-11-18	44.3	

Date	Feet below Surface	Feet to Sealevel
1973-05-23	70.2	
1973-05-21	71.6	
1973-05-19	72.7	
1973-05-17	75.3	
1973-05-15	76.7	
1973-05-13	79.0	
1973-05-11	79.0	
1973-05-09	78.8	
1973-05-07	76.7	
1973-05-05	73.9	
1973-05-03	71.6	
1973-04-05	40.3	
1973-04-03	39.2	
1973-04-01	38.0	
1973-03-28	37.2	
1973-03-26	37.4	
1973-03-24	37.4	
1973-03-22	37.4	
1973-03-20	36.3	
1973-03-18	35.7	
1973-03-16	35.5	
1973-03-14	36.0	
1973-03-12	36.3	
1973-03-10	36.6	
1973-03-08	36.6	
1973-03-04	35.5	
1973-02-28	35.5	
1973-02-23	35.6	
1973-02-18	35.6	
1973-02-15	35.8	
1973-02-13	36.0	
1973-02-09	36.3	
1973-02-07	35.9	
1973-01-30	37.4	
1973-01-28	37.6	
1973-01-20	37.7	
1973-01-12	37.8	
1973-01-09	39.4	
1973-01-07	39.8	
1973-01-03	39.8	
1973-01-01	40.2	
1972-12-30	40.4	
1972-12-27	41.0	
1972-12-23	41.0	
1972-12-19	40.8	
1972-12-14	41.0	
1972-12-08	43.2	
1972-12-05	43.0	
1972-12-01	42.8	
1972-11-27	43.0	
1972-11-25	43.3	
1972-11-23	43.5	
1972-11-21	43.7	
1972-11-19	44.2	
1972-11-17	44.4	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1972-11-16	44.5	
1972-11-14	46.4	
1972-11-12	47.2	
1972-11-10	47.6	
1972-11-08	48.3	
1972-11-06	48.5	
1972-11-04	49.0	
1972-11-02	49.5	
1972-10-31	50.4	
1972-10-29	51.2	
1972-10-27	52.0	
1972-10-25	54.3	
1972-10-23	56.6	
1972-10-21	58.7	
1972-10-19	60.4	
1972-10-17	61.8	
1972-10-15	62.4	
1972-10-13	62.8	
1972-10-11	63.0	
1972-10-06	63.7	
1972-10-02	63.7	
1972-09-30	63.5	
1972-09-28	63.3	
1972-09-26	63.5	
1972-09-24	64.1	
1972-09-22	64.7	
1972-09-20	65.5	
1972-09-18	67.5	
1972-09-16	69.2	
1972-09-14	72.1	
1972-09-12	74.7	
1972-09-10	78.5	
1972-09-08	82.1	
1972-09-06	83.0	
1972-09-04	85.5	
1972-09-02	88.7	
1972-08-31	90.4	
1972-08-29	91.0	
1972-08-27	91.8	
1972-08-25	92.9	
1972-08-23	92.1	
1972-08-21	92.1	
1972-08-19	91.7	
1972-08-17	90.8	
1972-08-15	90.1	
1972-08-13	91.3	
1972-08-11	90.0	
1972-08-07	90.4	
1972-08-05	91.8	
1972-08-03	91.8	
1972-08-01	91.7	
1972-07-30	91.4	
1972-07-28	89.0	
1972-07-26	85.5	
1972-07-24	84.4	

Date	Feet below Surface	Feet to Sealevel
1972-11-15	45.8	
1972-11-13	46.9	
1972-11-11	47.4	
1972-11-09	47.9	
1972-11-07	48.4	
1972-11-05	48.7	
1972-11-03	49.2	
1972-11-01	49.9	
1972-10-30	50.8	
1972-10-28	51.7	
1972-10-26	53.4	
1972-10-24	55.5	
1972-10-22	57.7	
1972-10-20	59.6	
1972-10-18	61.6	
1972-10-16	62.3	
1972-10-14	62.6	
1972-10-12	62.9	
1972-10-10	63.6	
1972-10-03	63.8	
1972-10-01	63.6	
1972-09-29	63.4	
1972-09-27	63.2	
1972-09-25	63.8	
1972-09-23	64.2	
1972-09-21	64.9	
1972-09-19	66.6	
1972-09-17	68.5	
1972-09-15	70.8	
1972-09-13	73.8	
1972-09-11	76.8	
1972-09-09	80.1	
1972-09-07	82.8	
1972-09-05	84.0	
1972-09-03	87.2	
1972-09-01	90.3	
1972-08-30	90.5	
1972-08-28	91.3	
1972-08-26	92.5	
1972-08-24	92.8	
1972-08-22	92.0	
1972-08-20	92.0	
1972-08-18	90.9	
1972-08-16	90.6	
1972-08-14	90.2	
1972-08-12	91.0	
1972-08-08	89.9	
1972-08-06	91.2	
1972-08-04	91.9	
1972-08-02	91.6	
1972-07-31	91.5	
1972-07-29	90.4	
1972-07-27	88.4	
1972-07-25	85.1	
1972-07-23	84.3	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1972-07-20	84.2	
1972-07-18	83.5	
1972-07-16	82.4	
1972-07-14	82.2	
1972-07-12	82.5	
1972-07-10	83.6	
1972-07-08	84.1	
1972-07-06	83.7	
1972-07-04	83.3	
1972-07-02	82.9	
1972-06-30	81.1	
1972-06-28	81.9	
1972-06-26	82.5	
1972-06-23	82.6	
1972-06-21	81.6	
1972-06-19	80.1	
1972-06-17	78.6	
1972-06-15	76.1	
1972-06-13	74.9	
1972-06-11	74.4	
1972-06-09	76.1	
1972-06-07	76.9	
1972-06-03	76.1	
1972-06-01	74.5	
1972-05-30	71.6	
1972-05-28	71.9	
1972-05-26	72.5	
1972-05-24	72.9	
1972-05-22	71.8	
1972-05-20	69.4	
1972-05-18	68.0	
1972-05-16	67.2	
1972-05-14	66.4	
1972-05-12	66.3	
1972-05-09	66.1	
1972-05-07	66.7	
1972-05-05	66.3	
1972-05-03	66.7	
1972-05-01	67.3	
1972-04-29	66.7	
1972-04-27	65.3	
1972-04-25	66.0	
1972-04-23	66.7	
1972-04-21	65.7	
1972-04-19	65.3	
1972-04-17	65.1	
1972-04-15	63.9	
1972-04-13	65.5	
1972-04-11	67.1	
1972-04-09	66.9	
1972-04-07	66.2	
1972-04-05	66.0	
1972-04-03	67.5	
1972-04-01	68.6	
1972-03-30	69.3	
1972-07-19	84.1	
1972-07-17	82.7	
1972-07-15	82.2	
1972-07-13	82.4	
1972-07-11	83.1	
1972-07-09	84.2	
1972-07-07	84.0	
1972-07-05	83.4	
1972-07-03	83.2	
1972-07-01	81.4	
1972-06-29	80.5	
1972-06-27	82.7	
1972-06-25	82.7	
1972-06-22	82.8	
1972-06-20	80.9	
1972-06-18	79.5	
1972-06-16	77.1	
1972-06-14	75.5	
1972-06-12	73.6	
1972-06-10	75.6	
1972-06-08	76.7	
1972-06-04	76.8	
1972-06-02	75.2	
1972-05-31	71.7	
1972-05-29	71.8	
1972-05-27	72.2	
1972-05-25	72.8	
1972-05-23	72.7	
1972-05-21	70.3	
1972-05-19	68.5	
1972-05-17	67.8	
1972-05-15	66.7	
1972-05-13	66.2	
1972-05-11	66.0	
1972-05-08	66.3	
1972-05-06	66.6	
1972-05-04	67.0	
1972-05-02	67.2	
1972-04-30	67.1	
1972-04-28	66.1	
1972-04-26	65.8	
1972-04-24	66.8	
1972-04-22	66.1	
1972-04-20	65.6	
1972-04-18	65.2	
1972-04-16	64.6	
1972-04-14	64.4	
1972-04-12	66.6	
1972-04-10	67.0	
1972-04-08	66.7	
1972-04-06	65.9	
1972-04-04	66.8	
1972-04-02	68.5	
1972-03-31	68.6	
1972-03-29	69.8	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1972-03-28	70.4	
1972-03-26	71.8	
1972-03-24	72.7	
1972-03-22	74.0	
1972-03-20	75.8	
1972-03-18	77.4	
1972-03-13	77.3	
1972-03-11	77.1	
1972-03-09	76.9	
1972-03-07	76.2	
1972-03-05	74.5	
1972-03-03	72.5	
1972-03-01	70.4	
1972-02-28	68.8	
1972-02-26	66.8	
1972-02-24	64.7	
1972-02-22	62.4	
1972-02-20	60.8	
1972-02-18	59.1	
1972-02-16	56.8	
1972-02-14	54.5	
1972-02-12	53.0	
1972-02-10	50.2	
1972-02-08	45.7	
1972-02-06	42.5	
1972-02-04	38.7	
1972-02-02	36.8	
1972-01-31	36.0	
1972-01-28	36.1	
1972-01-26	36.3	
1972-01-24	35.9	
1972-01-19	35.9	
1972-01-17	35.7	
1972-01-13	35.9	
1972-01-11	36.1	
1972-01-09	36.1	
1972-01-07	37.7	
1972-01-05	38.0	
1972-01-03	38.2	
1972-01-01	38.9	
1971-12-30	39.1	
1971-12-28	39.3	
1971-12-22	39.4	
1971-12-20	39.9	
1971-12-18	40.6	
1971-12-16	40.3	
1971-12-14	39.3	
1971-12-12	39.5	
1971-12-10	39.7	
1971-12-08	39.7	
1971-12-06	40.6	
1971-12-04	40.8	
1971-12-02	41.0	
1971-11-30	41.3	
1971-11-28	41.9	
1972-03-27	70.7	
1972-03-25	72.3	
1972-03-23	73.4	
1972-03-21	74.7	
1972-03-19	77.0	
1972-03-14	77.4	
1972-03-12	77.2	
1972-03-10	77.0	
1972-03-08	76.7	
1972-03-06	75.5	
1972-03-04	73.5	
1972-03-02	71.3	
1972-02-29	69.4	
1972-02-27	68.1	
1972-02-25	65.8	
1972-02-23	63.5	
1972-02-21	61.6	
1972-02-19	59.9	
1972-02-17	57.9	
1972-02-15	55.9	
1972-02-13	53.7	
1972-02-11	51.3	
1972-02-09	47.0	
1972-02-07	43.5	
1972-02-05	40.7	
1972-02-03	37.6	
1972-02-01	36.1	
1972-01-29	35.9	
1972-01-27	36.2	
1972-01-25	36.0	
1972-01-20	36.0	
1972-01-18	35.8	
1972-01-14	35.8	
1972-01-12	36.0	
1972-01-10	36.2	
1972-01-08	36.0	
1972-01-06	37.9	
1972-01-04	38.1	
1972-01-02	38.7	
1971-12-31	39.0	
1971-12-29	39.2	
1971-12-23	39.3	
1971-12-21	39.7	
1971-12-19	40.3	
1971-12-17	40.7	
1971-12-15	40.2	
1971-12-13	39.4	
1971-12-11	39.6	
1971-12-09	39.8	
1971-12-07	40.1	
1971-12-05	40.7	
1971-12-03	40.9	
1971-12-01	41.2	
1971-11-29	41.6	
1971-11-27	42.1	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1971-11-26	42.4	
1971-11-24	42.9	
1971-11-22	43.4	
1971-11-20	43.9	
1971-11-18	44.6	
1971-11-16	48.8	
1971-11-14	49.9	
1971-11-12	51.1	
1971-11-10	51.8	
1971-11-08	52.4	
1971-11-06	53.1	
1971-11-04	54.0	
1971-11-02	54.9	
1971-10-31	56.1	
1971-10-29	57.3	
1971-10-27	59.0	
1971-10-25	60.6	
1971-10-23	61.4	
1971-10-21	60.9	
1971-10-19	61.6	
1971-10-17	61.8	
1971-10-15	61.4	
1971-10-13	60.6	
1971-10-11	60.4	
1971-10-09	60.4	
1971-10-07	60.6	
1971-10-05	62.3	
1971-10-03	65.0	
1971-10-01	67.1	
1971-09-29	67.0	
1971-09-27	67.0	
1971-09-25	69.6	
1971-09-23	70.9	
1971-09-21	74.5	
1971-09-19	78.0	
1971-09-17	78.9	
1971-09-15	79.5	
1971-09-13	81.8	
1971-09-11	83.2	
1971-09-09	83.7	
1971-09-07	83.5	
1971-09-05	83.5	
1971-09-03	83.2	
1971-09-01	83.1	
1971-08-30	84.0	
1971-08-28	84.4	
1971-08-26	84.1	
1971-08-24	84.7	
1971-08-22	86.1	
1971-08-20	87.1	
1971-08-18	87.7	
1971-08-16	87.8	
1971-08-14	87.4	
1971-08-12	86.9	
1971-08-10	87.3	
1971-11-25	42.7	
1971-11-23	43.2	
1971-11-21	43.6	
1971-11-19	44.2	
1971-11-17	44.8	
1971-11-15	49.4	
1971-11-13	50.4	
1971-11-11	51.6	
1971-11-09	52.1	
1971-11-07	52.7	
1971-11-05	53.5	
1971-11-03	54.5	
1971-11-01	55.3	
1971-10-30	56.7	
1971-10-28	58.0	
1971-10-26	59.8	
1971-10-24	60.9	
1971-10-22	61.7	
1971-10-20	61.4	
1971-10-18	61.7	
1971-10-16	61.7	
1971-10-14	61.0	
1971-10-12	60.5	
1971-10-10	60.3	
1971-10-08	60.5	
1971-10-06	61.5	
1971-10-04	63.6	
1971-10-02	66.5	
1971-09-30	67.3	
1971-09-28	67.1	
1971-09-26	68.0	
1971-09-24	70.6	
1971-09-22	72.9	
1971-09-20	75.8	
1971-09-18	78.8	
1971-09-16	79.0	
1971-09-14	80.8	
1971-09-12	82.4	
1971-09-10	83.6	
1971-09-08	83.6	
1971-09-06	83.6	
1971-09-04	83.4	
1971-09-02	82.7	
1971-08-31	83.8	
1971-08-29	84.2	
1971-08-27	84.3	
1971-08-25	84.6	
1971-08-23	84.9	
1971-08-21	86.7	
1971-08-19	87.4	
1971-08-17	87.9	
1971-08-15	87.5	
1971-08-13	87.0	
1971-08-11	87.1	
1971-08-09	87.2	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1971-08-08	87.0	
1971-08-06	86.8	
1971-08-04	85.5	
1971-08-02	83.8	
1971-07-31	83.8	
1971-07-29	85.0	
1971-07-27	86.5	
1971-07-25	85.2	
1971-07-23	81.6	
1971-07-21	82.2	
1971-07-19	82.6	
1971-07-17	83.5	
1971-07-15	81.8	
1971-07-13	81.1	
1971-07-11	81.6	
1971-07-09	81.2	
1971-07-07	81.0	
1971-07-05	81.2	
1971-07-03	81.3	
1971-07-01	80.7	
1971-06-29	80.8	
1971-06-27	80.6	
1971-06-25	79.3	
1971-06-23	78.3	
1971-06-21	75.1	
1971-06-19	71.6	
1971-06-17	67.4	
1971-06-15	65.1	
1971-06-13	64.2	
1971-06-11	63.3	
1971-06-09	62.3	
1971-06-07	61.6	
1971-06-05	61.3	
1971-06-03	61.8	
1971-06-01	62.1	
1971-05-30	62.4	
1971-05-28	63.1	
1971-05-26	63.2	
1971-05-24	62.2	
1971-05-22	60.7	
1971-05-20	59.1	
1971-05-18	59.1	
1971-05-16	59.1	
1971-05-14	59.3	
1971-05-12	59.6	
1971-05-10	60.4	
1971-05-08	61.9	
1971-05-06	62.1	
1971-05-04	60.4	
1971-05-02	58.3	
1971-04-30	57.3	
1971-04-28	56.2	
1971-04-26	55.8	
1971-04-24	57.7	
1971-04-22	60.2	

Date	Feet below Surface	Feet to Sealevel
1971-08-07	86.9	
1971-08-05	86.3	
1971-08-03	84.8	
1971-08-01	83.6	
1971-07-30	84.1	
1971-07-28	85.1	
1971-07-26	85.9	
1971-07-24	83.4	
1971-07-22	81.5	
1971-07-20	82.5	
1971-07-18	83.3	
1971-07-16	83.7	
1971-07-14	81.5	
1971-07-12	81.8	
1971-07-10	81.5	
1971-07-08	81.1	
1971-07-06	80.9	
1971-07-04	81.5	
1971-07-02	80.9	
1971-06-30	81.0	
1971-06-28	80.7	
1971-06-26	79.6	
1971-06-24	78.7	
1971-06-22	77.0	
1971-06-20	73.8	
1971-06-18	69.5	
1971-06-16	66.4	
1971-06-14	64.3	
1971-06-12	63.7	
1971-06-10	62.4	
1971-06-08	61.9	
1971-06-06	61.4	
1971-06-04	61.6	
1971-06-02	62.0	
1971-05-31	62.1	
1971-05-29	62.8	
1971-05-27	63.3	
1971-05-25	62.9	
1971-05-23	61.7	
1971-05-21	59.5	
1971-05-19	59.0	
1971-05-17	59.0	
1971-05-15	59.2	
1971-05-13	59.2	
1971-05-11	60.2	
1971-05-09	61.7	
1971-05-07	62.0	
1971-05-05	62.2	
1971-05-03	59.0	
1971-05-01	57.5	
1971-04-29	57.1	
1971-04-27	55.7	
1971-04-25	56.7	
1971-04-23	59.1	
1971-04-21	60.8	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1971-04-20	61.7	
1971-04-18	64.4	
1971-04-16	68.3	
1971-04-14	68.5	
1971-04-12	68.6	
1971-04-10	69.5	
1971-04-08	73.1	
1971-04-06	74.3	
1971-04-04	77.9	
1971-04-02	81.0	
1971-03-31	81.2	
1971-03-29	81.2	
1971-03-27	82.1	
1971-03-25	81.7	
1971-03-23	80.2	
1971-03-21	77.5	
1971-03-19	74.2	
1971-03-17	70.4	
1971-03-15	69.0	
1971-03-13	69.0	
1971-03-11	68.3	
1971-03-09	63.5	
1971-03-07	63.3	
1971-03-05	61.5	
1971-03-03	60.5	
1971-03-01	59.2	
1971-02-27	55.7	
1971-02-25	52.6	
1971-02-23	47.7	
1971-02-21	45.2	
1971-02-19	44.0	
1971-02-17	40.6	
1971-02-15	38.1	
1971-02-13	37.1	
1971-02-11	36.4	
1971-02-09	34.8	
1971-02-07	34.6	
1971-02-05	34.4	
1971-02-03	33.8	
1971-02-01	34.1	
1971-01-30	33.8	
1971-01-28	32.6	
1971-01-26	32.1	
1971-01-24	31.7	
1971-01-22	31.7	
1971-01-20	31.7	
1971-01-18	31.7	
1971-01-16	31.7	
1971-01-14	32.4	
1971-01-12	32.7	
1971-01-10	32.5	
1971-01-08	32.3	
1971-01-06	32.5	
1971-01-04	32.6	
1971-01-02	33.1	

Date	Feet below Surface	Feet to Sealevel
1971-04-19	62.8	
1971-04-17	66.3	
1971-04-15	68.6	
1971-04-13	68.3	
1971-04-11	69.3	
1971-04-09	69.9	
1971-04-07	73.8	
1971-04-05	75.7	
1971-04-03	80.4	
1971-04-01	81.1	
1971-03-30	81.1	
1971-03-28	82.0	
1971-03-26	82.2	
1971-03-24	81.1	
1971-03-22	79.0	
1971-03-20	76.2	
1971-03-18	72.1	
1971-03-16	68.4	
1971-03-14	69.2	
1971-03-12	68.5	
1971-03-10	64.7	
1971-03-08	63.2	
1971-03-06	62.5	
1971-03-04	61.2	
1971-03-02	59.9	
1971-02-28	57.4	
1971-02-26	53.9	
1971-02-24	50.1	
1971-02-22	45.9	
1971-02-20	44.7	
1971-02-18	42.7	
1971-02-16	39.4	
1971-02-14	37.4	
1971-02-12	35.9	
1971-02-10	35.0	
1971-02-08	34.7	
1971-02-06	34.5	
1971-02-04	34.2	
1971-02-02	33.9	
1971-01-31	33.9	
1971-01-29	33.0	
1971-01-27	32.4	
1971-01-25	31.7	
1971-01-23	31.7	
1971-01-21	31.7	
1971-01-19	31.7	
1971-01-17	31.7	
1971-01-15	31.6	
1971-01-13	32.8	
1971-01-11	32.6	
1971-01-09	32.4	
1971-01-07	32.4	
1971-01-05	32.5	
1971-01-03	32.9	
1971-01-01	33.9	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1970-12-31	34.0	
1970-12-29	34.2	
1970-12-27	34.3	
1970-12-25	34.5	
1970-12-23	34.7	
1970-12-21	34.9	
1970-12-19	35.2	
1970-12-17	35.3	
1970-12-15	37.3	
1970-12-13	37.3	
1970-12-11	37.0	
1970-12-09	36.8	
1970-12-07	37.1	
1970-12-05	37.5	
1970-12-03	37.8	
1970-12-01	38.2	
1970-11-29	38.4	
1970-11-27	38.6	
1970-11-25	38.8	
1970-11-23	39.2	
1970-11-21	39.4	
1970-11-19	39.7	
1970-11-17	41.6	
1970-11-15	42.1	
1970-11-13	42.5	
1970-11-11	42.9	
1970-11-09	42.9	
1970-11-07	43.3	
1970-11-05	45.5	
1970-11-03	47.2	
1970-11-01	49.2	
1970-10-30	50.7	
1970-10-28	52.7	
1970-10-26	54.0	
1970-10-24	55.0	
1970-10-22	56.0	
1970-10-20	58.7	
1970-10-18	59.4	
1970-10-16	60.4	
1970-10-14	61.5	
1970-10-12	62.6	
1970-10-10	62.6	
1970-10-08	63.6	
1970-10-06	64.5	
1970-10-04	65.1	
1970-10-02	64.0	
1970-09-30	63.2	
1970-09-28	63.3	
1970-09-26	64.5	
1970-09-24	65.2	
1970-09-22	67.4	
1970-09-20	69.4	
1970-09-18	69.4	
1970-09-16	68.5	
1970-09-14	67.7	
1970-12-30	34.1	
1970-12-28	34.2	
1970-12-26	34.4	
1970-12-24	34.6	
1970-12-22	34.8	
1970-12-20	35.1	
1970-12-18	35.3	
1970-12-16	35.9	
1970-12-14	37.4	
1970-12-12	37.2	
1970-12-10	36.9	
1970-12-08	37.0	
1970-12-06	37.3	
1970-12-04	37.6	
1970-12-02	38.1	
1970-11-30	38.3	
1970-11-28	38.5	
1970-11-26	38.7	
1970-11-24	39.0	
1970-11-22	39.3	
1970-11-20	39.5	
1970-11-18	40.7	
1970-11-16	41.8	
1970-11-14	42.2	
1970-11-12	42.8	
1970-11-10	43.0	
1970-11-08	43.2	
1970-11-06	44.2	
1970-11-04	46.5	
1970-11-02	48.2	
1970-10-31	50.2	
1970-10-29	51.2	
1970-10-27	53.5	
1970-10-25	54.5	
1970-10-23	55.5	
1970-10-21	56.6	
1970-10-19	59.3	
1970-10-17	59.9	
1970-10-15	60.8	
1970-10-13	62.0	
1970-10-11	62.7	
1970-10-09	62.7	
1970-10-07	64.4	
1970-10-05	64.9	
1970-10-03	64.4	
1970-10-01	63.5	
1970-09-29	62.8	
1970-09-27	64.0	
1970-09-25	64.7	
1970-09-23	66.1	
1970-09-21	68.9	
1970-09-19	69.5	
1970-09-17	68.8	
1970-09-15	68.1	
1970-09-13	67.8	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1970-09-12	68.8	
1970-09-10	71.9	
1970-09-08	73.8	
1970-09-06	74.3	
1970-09-04	74.2	
1970-09-02	76.4	
1970-08-31	79.5	
1970-08-29	81.1	
1970-08-27	80.9	
1970-08-25	80.5	
1970-08-23	81.2	
1970-08-21	81.1	
1970-08-19	80.4	
1970-08-17	80.4	
1970-08-15	80.3	
1970-08-13	80.2	
1970-08-11	79.6	
1970-08-09	78.0	
1970-08-07	76.7	
1970-08-05	77.5	
1970-08-03	78.0	
1970-08-01	78.2	
1970-07-30	78.5	
1970-07-28	78.0	
1970-07-26	76.8	
1970-07-24	76.1	
1970-07-22	75.8	
1970-07-20	74.9	
1970-07-18	74.6	
1970-07-16	74.6	
1970-07-14	73.9	
1970-07-12	72.0	
1970-07-10	70.4	
1970-07-08	69.0	
1970-07-06	69.0	
1970-07-04	68.0	
1970-07-02	69.1	
1970-06-30	71.3	
1970-06-28	72.7	
1970-06-26	73.4	
1970-06-24	73.6	
1970-06-22	72.6	
1970-06-20	71.7	
1970-06-18	70.6	
1970-06-16	69.9	
1970-06-14	69.5	
1970-06-12	69.1	
1970-06-10	68.9	
1970-06-08	68.7	
1970-06-06	67.9	
1970-06-04	66.2	
1970-06-02	64.1	
1970-05-31	64.3	
1970-05-29	64.2	
1970-05-27	64.3	
1970-09-11	70.3	
1970-09-09	73.1	
1970-09-07	74.2	
1970-09-05	74.0	
1970-09-03	75.9	
1970-09-01	78.5	
1970-08-30	81.0	
1970-08-28	81.0	
1970-08-26	80.8	
1970-08-24	81.1	
1970-08-22	81.3	
1970-08-20	80.6	
1970-08-18	80.3	
1970-08-16	80.5	
1970-08-14	80.1	
1970-08-12	79.8	
1970-08-10	78.8	
1970-08-08	77.1	
1970-08-06	77.4	
1970-08-04	77.6	
1970-08-02	78.2	
1970-07-31	78.3	
1970-07-29	78.3	
1970-07-27	77.5	
1970-07-25	76.2	
1970-07-23	76.0	
1970-07-21	75.3	
1970-07-19	74.8	
1970-07-17	74.5	
1970-07-15	74.6	
1970-07-13	73.2	
1970-07-11	71.0	
1970-07-09	69.9	
1970-07-07	69.2	
1970-07-05	68.8	
1970-07-03	68.2	
1970-07-01	69.4	
1970-06-29	72.2	
1970-06-27	73.2	
1970-06-25	73.7	
1970-06-23	73.2	
1970-06-21	71.7	
1970-06-19	71.5	
1970-06-17	70.0	
1970-06-15	69.8	
1970-06-13	69.3	
1970-06-11	68.4	
1970-06-09	69.0	
1970-06-07	68.5	
1970-06-05	67.0	
1970-06-03	64.5	
1970-06-01	64.2	
1970-05-30	64.4	
1970-05-28	64.2	
1970-05-26	64.5	

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1970-05-25	64.9	
1970-05-23	64.9	
1970-05-21	64.5	
1970-04-08	69.7	
1970-02-11	29	
1969-12-18	34.3	
1969-10-22	48.6	
1969-08-27	63.2	
1969-06-27	58.5	
1969-05-06	57.2	
1969-03-11	31	
1969-01-13	35.5	
1968-11-19	41.6	
1968-09-23	62.4	
1968-07-30	75.3	
1968-06-04	69.4	
1968-04-09	60.3	
1968-02-13	45.9	
1967-12-17	34.7	
1967-10-23	58.1	
1967-08-29	73.4	
1967-07-06	65.5	
1967-05-09	38.3	
1967-03-14	60	
1967-01-17	37.6	
1966-11-21	47.3	
1966-09-26	57	
1966-08-02	71.3	
1966-06-07	63.9	
1966-04-12	62.6	
1966-02-15	33.2	
1965-12-20	37.1	
1965-10-19	50.3	
1965-08-26	73.1	
1970-05-24	65.2	
1970-05-22	64.7	
1970-05-08	63.8	
1970-03-11	42.4	
1970-01-16	33.5	
1969-11-19	36.9	
1969-09-24	56.9	
1969-07-31	62.3	
1969-06-03	52.4	
1969-04-08	40.7	
1969-02-11	34.8	
1968-12-19	37.6	
1968-10-21	57.2	
1968-08-27	74.9	
1968-07-01	77.8	
1968-05-07	66.9	
1968-03-11	54.8	
1968-01-16	34.4	
1967-11-21	43.2	
1967-09-26	59.7	
1967-08-01	73.7	
1967-06-05	55.1	
1967-04-12	46.1	
1967-02-14	37.1	
1966-12-20	38.6	
1966-10-25	54.8	
1966-08-30	72.6	
1966-07-06	68.6	
1966-05-13	66.5	
1966-03-15	51.5	
1966-01-13	33.6	
1965-11-15	44.5	
1965-09-23	59.4	

Map ID:	84		
Agency cd:	USGS	Site no:	364535120194701
Site name:	013S015E35E001M		
Latitude:	364535	EDR Site id:	USGS3202475
Longitude:	1201947	Dec lat:	36.75967179
Dec lon:	-120.33072261	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NWSWNWS25 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	166.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19510205
Date inventoried:	19560110	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	230	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1962-09-01	Ground water data end date:	1962-09-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1962-09-01	17.00	

Map ID:	84		
Agency cd:	USGS	Site no:	364535120194703
Site name:	013S015E35E003M		
Latitude:	364535	EDR Site id:	USGS3202477
Longitude:	1201947	Dec lat:	36.75967179
Dec lon:	-120.33072261	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	166.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19510101
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	735	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1952-10-16
Water quality data end date:	1952-10-16	Water quality data count:	1
Ground water data begin date:	1962-09-01	Ground water data end date:	1962-09-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1962-09-01	124.00	

Map ID:	84		
Agency cd:	USGS	Site no:	364535120194702
Site name:	013S015E35E002M		
Latitude:	364535	EDR Site id:	USGS3202476
Longitude:	1201947	Dec lat:	36.75967179
Dec lon:	-120.33072261	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	166.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19510101
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	440	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1952-10-20
Water quality data end date:	1952-10-20	Water quality data count:	1
Ground water data begin date:	1962-09-01	Ground water data end date:	1962-09-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1962-09-01	52.00	

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	83		
Agency cd:	USGS	Site no:	364535120184701
Site name:	013S015E35D003M		
Latitude:	364535	EDR Site id:	USGS3202474
Longitude:	1201847	Dec lat:	36.75967168
Dec lon:	-120.31405543	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	166.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19510130
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	735	Hole depth:	735
Source of depth data:	Not Reported		
Project number:	479400204		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1951-02-15	Ground water data end date:	1983-02-11
Ground water data count:	163		

Ground-water levels, Number of Measurements: 163

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1983-02-11	76.4		1982-10-06	92.1	
1982-01-28	61.6		1981-09-16	103.3	
1981-02-04	53.3		1980-10-04	107.3	
1980-01-24	98.40		1979-09-18	114.0	
1979-01-24	106.4		1978-10-02	121.0	
1978-01-18	120.3		1977-10-05	127.2	
1977-01-14	102.5		1976-10-08	113.9	
1976-07-26	109		1976-01-19	103.1	
1975-10-07	110.4		1975-01-20	105.8	
1974-10-09	113.7		1974-01-30	109.3	
1973-10-09	120.2		1973-02-09	115.3	
1972-10-12	125		1972-02-09	120.4	
1972-01-04	121.7		1971-09-30	125.7	
1971-02-05	122		1970-09-28	129.2	
1968-12-18	85		1967-12-20	83.3	
1966-12-29	80		1965-02-08	127.2	
1964-10-05	129		1964-02-10	120.7	
1963-02-07	119.2		1962-10-16	129.2	
1962-05-21	118.10		1962-04-23	116.00	
1962-03-20	116.50		1962-02-27	116.3	
1962-01-16	117.40		1962-01-01	125.00	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1961-12-18	119.80	
1961-10-23	122	
1961-08-21	122.00	
1961-06-21	116.50	
1961-04-20	113.60	
1961-02-24	111.8	
1960-12-15	114.30	
1960-10-20	117.50	
1960-08-25	118.00	
1960-06-23	114.40	
1960-03-31	109.50	
1960-01-28	107.30	
1959-11-30	111.40	
1959-10-13	113.70	
1959-07-30	112.90	
1959-05-29	109.40	
1959-03-26	105.40	
1959-01-29	105.00	
1958-12-01	107.20	
1958-10-10	108.20	
1958-08-01	102.50	
1958-06-03	96.20	
1958-03-25	98.70	
1958-01-29	101.40	
1957-11-26	105.50	
1957-10-15	106.30	
1957-08-28	105.70	
1957-07-02	102.50	
1957-04-30	101.80	
1957-02-28	99.70	
1957-01-30	100.10	
1956-12-04	100.90	
1956-10-23	101.40	
1956-08-28	100.90	
1956-06-26	97.00	
1956-05-01	94.80	
1956-02-21	92.30	
1956-01-04	96.50	
1955-11-01	99.30	
1955-08-30	97.90	
1955-06-29	94.20	
1955-04-27	92.40	
1955-03-03	90.30	
1955-01-05	93.90	
1954-10-06	95.80	
1954-08-04	93.50	
1954-05-26	91.10	
1954-04-05	90.30	
1953-12-03	89.70	
1953-08-04	88.70	
1953-04-29	88.80	
1953-03-02	82.70	
1952-12-30	84.60	
1952-11-03	79.10	
1952-09-03	86.40	
1961-11-21	121.20	
1961-09-18	122.60	
1961-07-19	119.50	
1961-05-26	115.80	
1961-03-23	113.30	
1961-01-19	112.50	
1960-12-05	115.00	
1960-09-21	118.70	
1960-08-01	116.50	
1960-05-02	112.30	
1960-02-26	107.80	
1960-01-07	108.60	
1959-10-29	113.50	
1959-08-27	114.30	
1959-06-29	110.90	
1959-05-01	107.50	
1959-03-05	104.70	
1959-01-05	106.70	
1958-11-03	108.40	
1958-08-27	103.90	
1958-06-27	99.40	
1958-04-29	96.60	
1958-02-28	100.00	
1958-01-03	102.80	
1957-10-29	106.20	
1957-10-01	106.30	
1957-07-31	104.30	
1957-06-04	101.50	
1957-04-02	100.40	
1957-02-21	99.90	
1957-01-03	100.30	
1956-10-30	101.80	
1956-09-26	101.90	
1956-07-31	97.20	
1956-05-29	96.10	
1956-03-23	91.80	
1956-01-31	93.90	
1955-11-29	99.00	
1955-09-28	99.50	
1955-07-26	95.40	
1955-05-26	93.70	
1955-04-01	91.10	
1955-01-28	91.60	
1954-12-02	95.30	
1954-09-03	95.30	
1954-06-28	91.40	
1954-04-29	91.10	
1954-01-18	88.80	
1953-09-22	91.80	
1953-06-01	86.60	
1953-04-01	85.00	
1953-02-02	82.30	
1952-12-01	83.60	
1952-10-02	81.40	
1952-07-30	84.40	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1952-03-18	77.80	
1951-07-12	79.50	
1951-05-11	76.50	
1951-04-12	67.10	
1951-03-15	65.10	
1951-02-15	73.50	
1951-09-19	82.80	
1951-06-28	78.80	
1951-04-27	68.60	
1951-03-30	67.20	
1951-03-02	69.90	

Map ID:	85		
Agency cd:	USGS	Site no:	364531120210300
Site name:	013S015E32H002M		
Latitude:	364531	EDR Site id:	USGS3202471
Longitude:	1202103	Dec lat:	36.75856083
Dec lon:	-120.35183433	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19640101
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	85		
Agency cd:	USGS	Site no:	364531120210101
Site name:	013S015E32H001M		
Latitude:	364531	EDR Site id:	USGS3202470
Longitude:	1202101	Dec lat:	36.75856082
Dec lon:	-120.35127876	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	86		
Agency cd:	USGS	Site no:	364523120185901
Site name:	013S015E34J007M		
Latitude:	364523	EDR Site id:	USGS3202463
Longitude:	1201859	Dec lat:	36.75633842
Dec lon:	-120.31738877	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	163.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19840829
Date inventoried:	Not Reported	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	ALLUVIUM ABOVE E-CLAY		
Well depth:	224	Hole depth:	230
Source of depth data:	driller		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1985-03-26
Water quality data end date:	1985-03-26	Water quality data count:	1
Ground water data begin date:	0000-00-00	Ground water data end date:	0000-00-00
Ground water data count:	0		

Ground-water levels, Number of Measurements: 0

Map ID:	87		
Agency cd:	USGS	Site no:	364522120222001
Site name:	013S015E31J002M		
Latitude:	364522	EDR Site id:	USGS3202461
Longitude:	1202220	Dec lat:	36.75606101
Dec lon:	-120.3732238	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	152		
Altitude method:	Level or other surveying method		
Altitude accuracy:	.01		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19850802
Date inventoried:	19850802	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	27	Hole depth:	27
Source of depth data:	reporting agency (generally USGS)		
Project number:	470645674		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1985-11-05
Water quality data end date:	1988-02-23	Water quality data count:	6
Ground water data begin date:	1985-08-22	Ground water data end date:	1992-05-07
Ground water data count:	33		

Ground-water levels, Number of Measurements: 33

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07					

Note: The site was dry (no water level recorded).

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1991-02-07					
Note: The site was dry (no water level recorded).					
1990-02-28					
Note: The site was dry (no water level recorded).					
1989-07-27					
Note: The site was dry (no water level recorded).					
1989-06-30					
Note: The site was dry (no water level recorded).					
1989-05-25					
Note: The site was dry (no water level recorded).					
1989-04-28					
Note: The site was dry (no water level recorded).					
1989-03-23					
Note: The site was dry (no water level recorded).					
1989-02-24					
Note: The site was dry (no water level recorded).					
1989-01-24					
Note: The site was dry (no water level recorded).					
1988-04-04	23.22		1988-03-01	20.41	
1988-02-01	19.08		1988-01-01	19.88	
1987-12-01	21.29				
1987-11-01					
Note: The site was dry (no water level recorded).					
1987-10-05					
Note: The site was dry (no water level recorded).					
1987-09-01					
Note: The site was dry (no water level recorded).					
1987-08-01					
Note: The site was dry (no water level recorded).					
1987-07-01					
Note: The site was dry (no water level recorded).					
1987-06-01	22.32		1987-05-13	20.33	
1987-04-21	18.81		1987-01-01	16.5	
1986-11-01	18.5		1986-07-22	18.84	
1986-05-06	15.54		1986-02-27	16.97	
1986-01-01	14.5		1985-12-10	19.32	
1985-10-31	20.86		1985-10-16	21.19	
1985-08-22	22.20				

Map ID:	88		
Agency cd:	USGS	Site no:	364522120191001
Site name:	013S015E34K002M		
Latitude:	364522	EDR Site id:	USGS3202460
Longitude:	1201910	Dec lat:	36.75606066
Dec lon:	-120.32044441	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000

Altitude:	162.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19620830
Date inventoried:	19630627	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	257	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	87		
Agency cd:	USGS	Site no:	364521120222001
Site name:	013S015E31J003M		
Latitude:	364521	EDR Site id:	USGS3202458
Longitude:	1202220	Dec lat:	36.75578323
Dec lon:	-120.37322379	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	152		
Altitude method:	Level or other surveying method		
Altitude accuracy:	1.0		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19850723
Date inventoried:	19850723	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	415	Hole depth:	415
Source of depth data:	driller		
Project number:	470645674		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00

Peak flow data count:	0	Water quality data begin date:	1985-11-21
Water quality data end date:	1985-11-21	Water quality data count:	1
Ground water data begin date:	1985-08-22	Ground water data end date:	1992-05-07
Ground water data count:	40		

Ground-water levels, Number of Measurements: 40

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07	98.73		1991-07-24	101.03	
1991-02-07	61.63		1990-08-15	69.15	
1990-04-20	47.00		1990-02-28	43.30	
1989-07-12	48.10		1989-06-30	42.43	
1989-05-25	40.06				
1989-04-28	37.85				
Note: The water level was affected by stage in nearby surface-water site.					
1989-03-23	63.10		1989-02-24	41.25	
1989-01-24	51.63		1988-11-22	64.21	
1988-10-26	60.47		1988-07	59.18	
1988-06	57.05		1988-05-09	37.12	
1988-04-04	56.02		1988-03	32.92	
1988-02	20.69		1988-01	21.79	
1987-12	21.78		1987-11	25.93	
1987-10-05	40.40		1987-09	40.62	
1987-08	57.89		1987-07	56.41	
1987-06	49.62		1987-05-13	42.48	
1987-01	19.1		1986-11	21.7	
1986-07-22	39.62		1986-05-06	21.25	
1986-02-27	18.19		1986-01	19.4	
1985-12-10	20.59		1985-10-31	22.93	
1985-10-16	24.76		1985-08-22	43.7	

Map ID:	90		
Agency cd:	USGS	Site no:	364521120184902
Site name:	013S015E34J002M		
Latitude:	364521	EDR Site id:	USGS3202457
Longitude:	1201849	Dec lat:	36.75578285
Dec lon:	-120.31461089	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19620330
Date inventoried:	19621008	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	290	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00

Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1962-09-01	Ground water data end date:	1962-09-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1962-09-01	45.00	

Map ID:	90		
Agency cd:	USGS	Site no:	364521120184901
Site name:	013S015E34J001M		
Latitude:	364521	EDR Site id:	USGS3202456
Longitude:	1201849	Dec lat:	36.75578285
Dec lon:	-120.31461089	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19620101
Date inventoried:	19621008	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	65	Hole depth:	Not Reported
Source of depth data:	reporting agency (generally USGS)		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	0000-00-00	Ground water data end date:	0000-00-00
Ground water data count:	0		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	87		
Agency cd:	USGS	Site no:	364520120222011
Site name:	013S015E31J012M		
Latitude:	364520	EDR Site id:	USGS3202450
Longitude:	1202220	Dec lat:	36.75550546
Dec lon:	-120.37322378	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	153		
Altitude method:	Level or other surveying method		
Altitude accuracy:	1.0		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19880811
Date inventoried:	19880811	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	66.83	Hole depth:	66.83
Source of depth data:	driller		
Project number:	470642800		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1988-08-09
Water quality data end date:	1991-11-06	Water quality data count:	30
Ground water data begin date:	1988-10-26	Ground water data end date:	1992-05-07
Ground water data count:	15		

Ground-water levels, Number of Measurements: 15

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07	53.19		1991-07-24	51.51	
1991-02-07	38.08		1990-09-15	37.59	
1990-02-28	26.86				
1989-07-12	28.62				
Note: The water level was affected by stage in nearby surface-water site.					
1989-06-30	27.99		1989-05-25	28.42	
1989-04-28	28.59		1989-03-23	30.30	
1989-02-24	28.31		1989-01-24	30.49	
1988-11-29	31.47		1988-11-22	31.65	
1988-10-26	31.04				

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	87		
Agency cd:	USGS	Site no:	364520120222012
Site name:	013S015E31J013M		
Latitude:	364520	EDR Site id:	USGS3202451
Longitude:	1202220	Dec lat:	36.75550546
Dec lon:	-120.37322378	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	153		
Altitude method:	Level or other surveying method		
Altitude accuracy:	1.0		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19880812
Date inventoried:	19880812	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	37.77	Hole depth:	37.77
Source of depth data:	driller		
Project number:	470642800		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1988-11-29
Water quality data end date:	1988-11-29	Water quality data count:	1
Ground water data begin date:	1988-10-26	Ground water data end date:	1992-05-07
Ground water data count:	14		

Ground-water levels, Number of Measurements: 14

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07	36.03		1991-02-07	34.74	
1990-08-15	31.42		1990-02-28	27.44	
1989-07-27	28.74		1989-06-30	28.70	
1989-05-25	29.71		1989-04-28	29.70	
1989-03-23	29.50		1989-02-24	29.91	
1989-01-24	26.26		1988-11-29	29.88	
1988-11-22	29.77		1988-10-26	29.38	

Map ID:	87		
Agency cd:	USGS	Site no:	364520120222014
Site name:	013S015E31J015M		
Latitude:	364520	EDR Site id:	USGS3202453
Longitude:	1202220	Dec lat:	36.75550546
Dec lon:	-120.37322378	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Altitude:	153		
Altitude method:	Level or other surveying method		
Altitude accuracy:	1.0		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19880815
Date inventoried:	19880815	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	23.72	Hole depth:	23.72
Source of depth data:	driller		
Project number:	470642800		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1988-10-26	Ground water data end date:	1992-05-07
Ground water data count:	11		

Ground-water levels, Number of Measurements: 11

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07	22.40		1991-02-07	23.16	
1990-02-28	23.13		1989-06-30	23.14	
1989-05-25	23.63				
1989-04-28	23.14				
Note: The water level was affected by stage in nearby surface-water site.					
1989-03-23	23.15		1989-02-24	23.17	
1989-01-24					
Note: The site was dry (no water level recorded).					
1988-11-22	23.07		1988-10-26	21.86	

Map ID:	87		
Agency cd:	USGS	Site no:	364520120222006
Site name:	013S015E31J007M		
Latitude:	364520	EDR Site id:	USGS3202445
Longitude:	1202220	Dec lat:	36.75550546
Dec lon:	-120.37322378	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	152		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19870408
Date inventoried:	19870408	Mean greenwich time offset:	PST

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	57.0	Hole depth:	61.4
Source of depth data:	owner		
Project number:	470645679		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1987-04-22
Water quality data end date:	1989-07-13	Water quality data count:	4
Ground water data begin date:	1987-04-21	Ground water data end date:	1992-05-07
Ground water data count:	31		

Ground-water levels, Number of Measurements: 31

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07	53.37		1991-07-24	51.35	
1991-02-07	37.91		1990-08-15	37.01	
1990-02-28	26.73		1989-07-27	29.86	
1989-07-12	28.60		1989-06-30	27.96	
1989-05-25	27.82		1989-04-28	28.49	
1989-03-23	30.21		1989-02-24	28.22	
1989-01-24	30.39		1988-11-22	31.54	
1988-10-26	31.48		1988-07-01	28.66	
1988-06-01	27.52		1988-05-09	23.41	
1988-04-04	25.54		1988-03-01	20.96	
1988-02-01	18.72		1988-01-01	19.44	
1987-12-01	20.26		1987-11-01	22.48	
1987-10-05	24.83		1987-09-01	26.56	
1987-08-01	27.79		1987-07-01	26.15	
1987-06-01	23.91		1987-05-13	21.63	
1987-04-21	19.83				

Map ID:	87		
Agency cd:	USGS	Site no:	364520120222013
Site name:	013S015E31J014M		
Latitude:	364520	EDR Site id:	USGS3202452
Longitude:	1202220	Dec lat:	36.75550546
Dec lon:	-120.37322378	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	153		
Altitude method:	Level or other surveying method		
Altitude accuracy:	1.0		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19880812
Date inventoried:	19880812	Mean greenwich time offset:	PST

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	26.67	Hole depth:	26.67
Source of depth data:	driller		
Project number:	470642800		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1988-10-26	Ground water data end date:	1992-05-07
Ground water data count:	14		

Ground-water levels, Number of Measurements: 14

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07	26.10		1991-02-07	26.08	
1990-05-15					
Note: The site was dry (no water level recorded).					
1990-02-28	26.08		1989-07-27	26.08	
1989-06-30	26.41		1989-05-25	26.60	
1989-04-28	26.07				
1989-03-23					
Note: The site was dry (no water level recorded).					
1989-02-24					
Note: The site was dry (no water level recorded).					
1989-01-24					
Note: The site was dry (no water level recorded).					
1988-11-29					
Note: The site was dry (no water level recorded).					
1988-11-22	26.39		1988-10-26	26.25	

Map ID:	87		
Agency cd:	USGS	Site no:	364520120222008
Site name:	013S015E31J009M		
Latitude:	364520	EDR Site id:	USGS3202447
Longitude:	1202220	Dec lat:	36.75550546
Dec lon:	-120.37322378	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	152		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19870409
Date inventoried:	19870608	Mean greenwich time offset:	PST

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	40.7	Hole depth:	40.7
Source of depth data:	owner		
Project number:	470645672		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1987-04-22
Water quality data end date:	1988-02-23	Water quality data count:	2
Ground water data begin date:	1987-04-21	Ground water data end date:	1992-05-07
Ground water data count:	31		

Ground-water levels, Number of Measurements: 31

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07					
Note: The site was dry (no water level recorded).					
1991-07-24	37.39		1991-02-07	34.40	
1990-08-15	31.10		1990-02-28	27.02	
1989-07-27	28.32		1989-07-12	28.27	
1989-06-30	28.32		1989-05-25	28.89	
1989-04-28	29.35		1989-03-23	29.14	
1989-02-24	29.53		1989-01-24	29.96	
1988-11-22	29.44		1988-10-26	29.28	
1988-07-01	26.17		1988-06-01	25.28	
1988-05-09	23.51		1988-04-04	23.10	
1988-03-01	20.52		1988-02-01	19.09	
1988-01-01	19.88		1987-12-01	21.35	
1987-11-01	24.20		1987-10-01	25.10	
1987-09-01	25.99		1987-08-01	25.47	
1987-07-01	24.07		1987-06-01	22.27	
1987-05-13	20.24		1987-04-21	18.30	

Map ID:	87		
Agency cd:	USGS	Site no:	364520120222015
Site name:	013S015E31J016M		
Latitude:	364520	EDR Site id:	USGS3202454
Longitude:	1202220	Dec lat:	36.75550546
Dec lon:	-120.37322378	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	164		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19900815
Date inventoried:	19900815	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	66.92	Hole depth:	70
Source of depth data:	geologist		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1990-08-23
Water quality data end date:	1990-08-30	Water quality data count:	4
Ground water data begin date:	0000-00-00	Ground water data end date:	0000-00-00
Ground water data count:	0		

Ground-water levels, Number of Measurements: 0

Map ID:	87		
Agency cd:	USGS	Site no:	364520120222001
Site name:	013S015E31J004M		
Latitude:	364520	EDR Site id:	USGS3202444
Longitude:	1202220	Dec lat:	36.75550546
Dec lon:	-120.37322378	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	153		
Altitude method:	Level or other surveying method		
Altitude accuracy:	1.0		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19850716
Date inventoried:	19850716	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	70	Hole depth:	70
Source of depth data:	driller		
Project number:	470645674		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1985-11-21
Water quality data end date:	1987-04-23	Water quality data count:	2
Ground water data begin date:	1985-08-22	Ground water data end date:	1992-05-07
Ground water data count:	42		

Ground-water levels, Number of Measurements: 42

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07	54.42		1991-07-24	51.46	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1991-02-07	38.00		1990-08-15	37.48	
1990-04-20	29.63		1990-02-28	26.78	
1989-07-27	29.92		1989-07-12	28.67	
1989-06-30	28.01		1989-05-25	27.85	
1989-04-28	28.52		1989-03-23	30.23	
1989-02-24	28.26		1989-01-24	30.43	
1988-11-22	31.14		1988-10-26	31.53	
1988-07	28.70		1988-06	27.59	
1988-05-09	23.45		1988-04-04	25.61	
1988-03	21.02		1988-02	18.76	
1988-01	19.53		1987-12	20.30	
1987-11	22.55		1987-10-05	24.92	
1987-09	26.64		1987-08	27.87	
1987-07	26.21		1987-06	23.98	
1987-05-13	21.70		1987-04-21	19.75	
1987-01	16.6		1986-11	18.3	
1986-07-22	20.44		1986-05-06	15.87	
1986-02-27	16.71		1986-01	17.6	
1985-12-10	18.19		1985-10-31	19.79	
1985-10-16	20.57		1985-08-22	23.60	

Map ID:	87		
Agency cd:	USGS	Site no:	364520120222010
Site name:	013S015E31J011M		
Latitude:	364520	EDR Site id:	USGS3202449
Longitude:	1202220	Dec lat:	36.75550546
Dec lon:	-120.37322378	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	152		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19870410
Date inventoried:	19870410	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	47.0	Hole depth:	47.0
Source of depth data:	owner		
Project number:	470645679		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Peak flow data count: 0
Water quality data begin date: 1987-04-22
Water quality data end date: 1988-02-24
Water quality data count: 2
Ground water data begin date: 1987-04-21
Ground water data end date: 1992-05-07
Ground water data count: 30

Ground-water levels, Number of Measurements: 30

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07	46.30		1991-07-24	44.21	
1991-02-07	35.77		1990-08-15	33.16	
1990-02-28	27.40		1989-07-27	29.17	
1989-07-12	28.75		1989-06-30	28.68	
1989-05-25	29.09		1989-04-28	29.59	
1989-03-23	29.78		1989-02-24	29.73	
1988-11-22	30.18		1988-10-26	29.84	
1988-07-01	26.92		1988-06-01	26.00	
1988-05-09	23.96		1988-04-04	23.89	
1988-03-01	20.95		1988-02-01	19.46	
1988-01-01	20.24		1987-12-01	21.50	
1987-11-01	24.17		1987-10-05	25.56	
1987-09-01	26.64		1987-08-01	26.39	
1987-07-01	24.98		1987-06-01	23.05	
1987-05-13	21.00		1987-04-21	18.69	

Map ID: 87
Agency cd: USGS
Site no: 364520120222007
Site name: 013S015E31J008M
Latitude: 364520
EDR Site id: USGS3202446
Longitude: 1202220
Dec lat: 36.75550546
Dec lon: -120.37322378
Coor meth: M
Coor accr: S
Latlong datum: NAD27
Dec latlong datum: NAD83
District: 06
State: 06
County: 019
Country: US
Land net: Not Reported
Location map: MENDOTA DAM
Map scale: 24000
Altitude: 152
Altitude method: Interpolated from topographic map
Altitude accuracy: 2.5
Altitude datum: National Geodetic Vertical Datum of 1929
Hydrologic: TulareBuena Vista Lakes. California. Area = 8510 sq.mi.
Topographic: Valley flat
Site type: Ground-water other than Spring
Date construction: 19870409
Date inventoried: 19870409
Mean greenwich time offset: PST
Local standard time flag: Y
Type of ground water site: Single well, other than collector or Ranney type
Aquifer Type: Not Reported
Aquifer: Not Reported
Well depth: 51.0
Hole depth: 51.0
Source of depth data: owner
Project number: 470645679
Real time data flag: 0
Daily flow data begin date: 0000-00-00
Daily flow data end date: 0000-00-00
Daily flow data count: 0
Peak flow data begin date: 0000-00-00
Peak flow data end date: 0000-00-00

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Peak flow data count: 0
Water quality data begin date: 1987-04-23
Water quality data end date: 1988-02-23
Water quality data count: 2
Ground water data begin date: 1987-04-21
Ground water data end date: 1992-05-07
Ground water data count: 31

Ground-water levels, Number of Measurements: 31

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07	50.20		1991-07-24	50.97	
1991-02-07	37.78		1990-08-15	37.00	
1990-02-28	27.05		1989-07-27	29.95	
1989-07-12	28.78		1989-06-30	28.23	
1989-05-25	28.15		1989-04-28	28.81	
1989-03-23	30.29		1989-02-24	28.59	
1989-01-24	30.50		1988-11-22	31.65	
1988-10-26	31.57		1988-07-01	28.73	
1988-06-01	27.59		1988-05-09	23.73	
1988-04-04	25.62		1988-03-01	21.22	
1988-02-01	19.01		1988-01-01	19.77	
1987-12-01	20.62		1987-11-01	22.90	
1987-10-01	25.10		1987-09-01	26.69	
1987-08-01	27.70		1987-07-01	26.08	
1987-06-01	23.95		1987-05-13	21.70	
1987-04-21	19.64				

Map ID: 87
Agency cd: USGS
Site no: 364520120222009
Site name: 013S015E31J010M
Latitude: 364520
EDR Site id: USGS3202448
Longitude: 1202220
Dec lat: 36.75550546
Dec lon: -120.37322378
Coor meth: M
Coor accr: S
Latlong datum: NAD27
Dec latlong datum: NAD83
District: 06
State: 06
County: 019
Country: US
Land net: Not Reported
Location map: MENDOTA DAM
Map scale: 24000
Altitude: 152
Altitude method: Interpolated from topographic map
Altitude accuracy: 2.5
Altitude datum: National Geodetic Vertical Datum of 1929
Hydrologic: TulareBuena Vista Lakes. California. Area = 8510 sq.mi.
Topographic: Valley flat
Site type: Ground-water other than Spring
Date construction: 19870409
Date inventoried: 19870409
Mean greenwich time offset: PST
Local standard time flag: Y
Type of ground water site: Single well, other than collector or Ranney type
Aquifer Type: Not Reported
Aquifer: Not Reported
Well depth: 34.5
Hole depth: 35.0
Source of depth data: owner
Project number: 470645672
Real time data flag: 0
Daily flow data begin date: 0000-00-00
Daily flow data end date: 0000-00-00
Daily flow data count: 0
Peak flow data begin date: 0000-00-00
Peak flow data end date: 0000-00-00

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Peak flow data count: 0
Water quality data begin date: 1987-04-22
Water quality data end date: 1988-02-23
Water quality data count: 2
Ground water data begin date: 1987-04-21
Ground water data end date: 1992-05-07
Ground water data count: 30

Ground-water levels, Number of Measurements: 30

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07					
Note: The site was dry (no water level recorded).					
1991-02-07					
Note: The site was dry (no water level recorded).					
1990-08-15	31.39		1990-04-20	28.36	
1990-02-28	27.37		1989-07-27	28.66	
1989-07-12	28.57		1989-06-30	28.63	
1989-05-25	29.20		1989-04-28	29.63	
1989-03-23	29.43		1989-02-24	29.83	
1989-01-24	30.24		1988-11-22	29.73	
1988-10-26	29.38		1988-07	26.41	
1988-06	25.51		1988-05-09	23.80	
1988-04-04	23.34		1988-03	20.67	
1988-02	19.33		1988-01	20.11	
1987-12	21.62		1987-11	24.51	
1987-10-05	25.48		1987-09	26.26	
1987-07	24.35		1987-06	22.49	
1987-05-13	20.53		1987-04-21	18.78	

Map ID: 91
Agency cd: USGS
Site no: 364519120225101
Site name: 013S015E31M002M
Latitude: 364519
EDR Site id: USGS3202442
Longitude: 1202251
Dec lat: 36.75522774
Dec lon: -120.38183515
Coor meth: M
Coor accr: U
Latlong datum: NAD27
Dec latlong datum: NAD83
District: 06
State: 06
County: 019
Country: US
Land net: Not Reported
Location map: Not Reported
Map scale: Not Reported
Altitude: 170.00
Altitude method: Interpolated from topographic map
Altitude accuracy: 2.5
Altitude datum: National Geodetic Vertical Datum of 1929
Hydrologic: Middle San JoaquinLower Chowchilla. California. Area = 2640 sq.mi.
Topographic: Not Reported
Site type: Ground-water other than Spring
Date construction: Not Reported
Date inventoried: Not Reported
Mean greenwich time offset: PST
Local standard time flag: Y
Type of ground water site: Single well, other than collector or Ranney type
Aquifer Type: Not Reported
Aquifer: Not Reported
Well depth: Not Reported
Hole depth: Not Reported
Source of depth data: Not Reported
Project number: Not Reported
Real time data flag: Not Reported
Daily flow data begin date: Not Reported
Daily flow data end date: Not Reported
Daily flow data count: Not Reported
Peak flow data begin date: Not Reported
Peak flow data end date: Not Reported

Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	87		
Agency cd:	USGS	Site no:	364519120222001
Site name:	013S015E31J005M		
Latitude:	364519	EDR Site id:	USGS3202441
Longitude:	1202220	Dec lat:	36.75522769
Dec lon:	-120.37322377	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	153		
Altitude method:	Level or other surveying method		
Altitude accuracy:	1.0		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19850716
Date inventoried:	19850716	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	260	Hole depth:	260
Source of depth data:	driller		
Project number:	470645674		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1985-11-20
Water quality data end date:	1991-11-06	Water quality data count:	3
Ground water data begin date:	1985-08-22	Ground water data end date:	1992-05-07
Ground water data count:	41		

Ground-water levels, Number of Measurements: 41

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07	84.84		1991-07-24	77.93	
1991-02-07	50.30		1990-08-15	54.31	
1990-04-20	38.72		1990-02-28	33.89	
1989-07-27	43.64		1989-07-12	39.47	
1989-06-30	36.29		1989-05-25	35.58	
1989-04-28	33.32		1989-03-23	48.96	
1989-02-24	35.37		1989-01-24	42.45	
1988-11-22	49.64		1988-10-26	49.08	
1988-07	47.25		1988-06	46.36	
1988-05-09	30.96		1988-04-04	43.86	
1988-03	29.44		1988-02	20.24	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1988-01	20.35		1987-12	20.82	
1987-11	23.78		1987-10-05	33.27	
1987-09	35.49		1987-08	47.01	
1987-07	44.67		1987-06	41.19	
1987-05-13	36.01		1987-01	17.6	
1986-11	21.3		1986-07-22	32.86	
1986-05-06	19.98		1986-02-27	17.29	
1986-01	18.5		1985-12-10	19.44	
1985-10-31	21.41		1985-10-16	22.71	
1985-08-22	35.2				

Map ID:	87		
Agency cd:	USGS	Site no:	364518120222001
Site name:	013S015E31J006M		
Latitude:	364518	EDR Site id:	USGS3202438
Longitude:	1202220	Dec lat:	36.75494991
Dec lon:	-120.37322376	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	152		
Altitude method:	Level or other surveying method		
Altitude accuracy:	1.0		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19850715
Date inventoried:	19850715	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	495	Hole depth:	500
Source of depth data:	driller		
Project number:	470645674		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1985-11-25
Water quality data end date:	1985-11-25	Water quality data count:	1
Ground water data begin date:	1985-08-22	Ground water data end date:	1992-05-07
Ground water data count:	42		

Ground-water levels, Number of Measurements: 42

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1992-05-07	94.38		1991-07-24	125.97	
1991-02-07	107.32		1990-08-15	101.52	
1990-04-20	85.21		1990-02-28	81.23	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1989-07-27	88.47		1989-07-12	86.01	
1989-06-30	84.11		1989-05-25	80.52	
1989-04-28	79.72		1989-03-23	76.70	
1989-02-24	75.12		1989-01-24	76.35	
1988-11-22	80.53		1988-10-26	82.50	
1988-07	76.84		1988-06	73.95	
1988-05-09	73.81		1988-04-04	72.48	
1988-03	70.33		1988-02	70.93	
1988-01	72.67		1987-12	75.04	
1987-11	77.08		1987-10-05	78.63	
1987-09	79.39		1987-08	77.97	
1987-07	75.16		1987-06	73.29	
1987-05-13	72.60		1987-01	75.4	
1986-11	78.4		1986-07-22	78.25	
1986-05-06	77.66		1986-02-17	78.29	
1986-01	79.9		1985-12-10	83.37	
1985-10-31	87.27		1985-10-16	88.78	
1985-08-24	91.9		1985-08-22	90.6	

Map ID:	92		
Agency cd:	USGS	Site no:	364515120210701
Site name:	013S015E32J001M		
Latitude:	364515	EDR Site id:	USGS3202435
Longitude:	1202107	Dec lat:	36.75411646
Dec lon:	-120.35294534	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	94		
Agency cd:	USGS	Site no:	364514120191001
Site name:	013S015E34K001M		
Latitude:	364514	EDR Site id:	USGS3202434
Longitude:	1201910	Dec lat:	36.75383847
Dec lon:	-120.32044435	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	162.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	1963
Date inventoried:	19630627	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	380	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	95		
Agency cd:	USGS	Site no:	364512120220701
Site name:	013S015E31J001M		
Latitude:	364512	EDR Site id:	USGS3202431
Longitude:	1202207	Dec lat:	36.75328325
Dec lon:	-120.36961249	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	Not Reported	Map scale:	Not Reported
Altitude:	163.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	Not Reported	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	97		
Agency cd:	USGS	Site no:	364508120221601
Site name:	013S015E31R001M		
Latitude:	364508	EDR Site id:	USGS3202425
Longitude:	1202216	Dec lat:	36.75217217
Dec lon:	-120.37211254	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NESESES31 T13S R15E M
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	164.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19510906	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	94		
Agency cd:	USGS	Site no:	364507120191001
Site name:	013S015E34Q001M		
Latitude:	364507	EDR Site id:	USGS3202597
Longitude:	1201910	Dec lat:	36.75189406
Dec lon:	-120.32044429	Coor meth:	M
Coor accr:	U	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	Not Reported
Location map:	MENDOTA DAM	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	19620828
Date inventoried:	19630627	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	ALLUVIUM ABOVE E-CLAY		
Well depth:	255	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1962-10-11
Water quality data end date:	1962-10-11	Water quality data count:	1
Ground water data begin date:	0000-00-00	Ground water data end date:	0000-00-00
Ground water data count:	0		

Ground-water levels, Number of Measurements: 0

Map ID:	98		
Agency cd:	USGS	Site no:	364500120220001
Site name:	013S015E32N001M		
Latitude:	364500	EDR Site id:	USGS3202584
Longitude:	1202200	Dec lat:	36.74994996
Dec lon:	-120.36766789	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	SWSWSWS32 T13S R15E M
Location map:	TRANQUILLITY	Map scale:	24000
Altitude:	163.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Flat surface		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19510906	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	Not Reported
Source of depth data:	Not Reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	100		
Agency cd:	USGS	Site no:	364456120211301
Site name:	014S015E05A001M		
Latitude:	364456	EDR Site id:	USGS3202549
Longitude:	1202113	Dec lat:	36.74883876
Dec lon:	-120.35461189	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NWNENES05 T14S R15E M
Location map:	TRANQUILLITY	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19550331
Date inventoried:	19560608	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	265	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1960-05-01	Ground water data end date:	1960-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05-01	42.00	

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	99		
Agency cd:	USGS	Site no:	364456120210501
Site name:	014S015E05A002M		
Latitude:	364456	EDR Site id:	USGS3202548
Longitude:	1202105	Dec lat:	36.74883875
Dec lon:	-120.3523896	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NENENES05 T14S R15E M
Location map:	TRANQUILLITY	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19550101
Date inventoried:	19560608	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	276	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1960-05-01	Ground water data end date:	1960-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05-01	36.00	

Map ID:	102		
Agency cd:	USGS	Site no:	364454120180201
Site name:	014S015E03B001M		
Latitude:	364454	EDR Site id:	USGS3202541
Longitude:	1201802	Dec lat:	36.74828286
Dec lon:	-120.3015547	Coor meth:	M
Coor accr:	M	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NWS03 T14S R15E M
Location map:	TRANQUILLITY	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19620823
Date inventoried:	19630627	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	195	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1963-10-07	Ground water data end date:	1963-10-07
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1963-10-07	40.20	

Map ID:	99		
Agency cd:	USGS	Site no:	364452120210301
Site name:	014S015E05A003M		
Latitude:	364452	EDR Site id:	USGS3202540
Longitude:	1202103	Dec lat:	36.74772764
Dec lon:	-120.35183399	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	NENENES05 T14S R15E M
Location map:	TRANQUILLITY	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19550326
Date inventoried:	19560608	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	ALLUVIUM ABOVE E-CLAY		
Well depth:	247	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1968-09-11
Water quality data end date:	1968-09-11	Water quality data count:	1
Ground water data begin date:	1960-05-01	Ground water data end date:	1960-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05-01	44.00	

Map ID:	99		
Agency cd:	USGS	Site no:	364448120210301
Site name:	014S015E05A004M		
Latitude:	364448	EDR Site id:	USGS3202536
Longitude:	1202103	Dec lat:	36.74661653
Dec lon:	-120.35183394	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	SENENES05 T14S R15E M
Location map:	TRANQUILLITY	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19550311
Date inventoried:	19560608	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	242	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1960-05-01	Ground water data end date:	1960-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05-01	44.00	

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Map ID:	99		
Agency cd:	USGS	Site no:	364445120210201
Site name:	014S015E05A005M		
Latitude:	364445	EDR Site id:	USGS3202533
Longitude:	1202102	Dec lat:	36.7457832
Dec lon:	-120.35155612	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	SENENES05 T14S R15E M
Location map:	TRANQUILLITY	Map scale:	24000
Altitude:	160.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	5.		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	19550307
Date inventoried:	19560608	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	240	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1960-05-01	Ground water data end date:	1960-05-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1960-05-01	42.00	

Map ID:	104		
Agency cd:	USGS	Site no:	364443120175701
Site name:	014S015E03H001M		
Latitude:	364443	EDR Site id:	USGS3202530
Longitude:	1201757	Dec lat:	36.74522732
Dec lon:	-120.30016563	Coor meth:	M
Coor accr:	M	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	S03 T14S R15E M
Location map:	TRANQUILLITY	Map scale:	24000
Altitude:	165.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19630305	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	480	Hole depth:	Not Reported
Source of depth data:	other reported		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

Map ID:	105		
Agency cd:	USGS	Site no:	364436120215601
Site name:	014S015E05E002M		
Latitude:	364436	EDR Site id:	USGS3202520
Longitude:	1202156	Dec lat:	36.74328331
Dec lon:	-120.36655648	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	06
State:	06	County:	019
Country:	US	Land net:	SWSWNWS05 T14S R15E M
Location map:	TRANQUILLITY	Map scale:	24000
Altitude:	163.00		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2.5		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	TulareBuena Vista Lakes. California. Area = 8510 sq.mi.		
Topographic:	Valley flat		
Site type:	Ground-water other than Spring	Date construction:	Not Reported
Date inventoried:	19850208	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	Not Reported	Hole depth:	16.5
Source of depth data:	reporting agency (generally USGS)		
Project number:	Not Reported		
Real time data flag:	Not Reported	Daily flow data begin date:	Not Reported
Daily flow data end date:	Not Reported	Daily flow data count:	Not Reported
Peak flow data begin date:	Not Reported	Peak flow data end date:	Not Reported
Peak flow data count:	Not Reported	Water quality data begin date:	Not Reported
Water quality data end date:	Not Reported	Water quality data count:	Not Reported
Ground water data begin date:	Not Reported	Ground water data end date:	Not Reported
Ground water data count:	Not Reported		

Ground-water levels, Number of Measurements: 0

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Water Well Information:

Longitude:	-120.3761
Latiude:	36.8111
Stwellno:	13S15E07K001M
Districtco:	8
Welluseco:	Z
Countyco:	20
Gwcode:	502207
Site id:	CADW40000033126

Longitude:	-120.3761
Latiude:	36.8111
Stwellno:	13S15E07K002M
Districtco:	8
Welluseco:	Z
Countyco:	20
Gwcode:	502207
Site id:	CADW40000033127

Longitude:	-120.35
Latiude:	36.8056
Stwellno:	13S15E17A001M
Districtco:	8
Welluseco:	Z
Countyco:	20
Gwcode:	502207
Site id:	CADW40000033061

Longitude:	-120.35
Latiude:	36.8056
Stwellno:	13S15E17A002M
Districtco:	8
Welluseco:	Z
Countyco:	20
Gwcode:	502207
Site id:	CADW40000033062

Longitude: -120.3097
Latiude: 36.8031
Stwellno: 13S15E14E002M
Districtco: 8
Welluseco: Z
Countyco: 20
Gwcode: 502207
Site id: CADW40000033050

Longitude: -120.3092
Latiude: 36.7986
Stwellno: 13S15E14M001M
Districtco: 8
Welluseco: Z
Countyco: 20
Gwcode: 502207
Site id: CADW40000033015

Longitude: -120.3825
Latiude: 36.7983
Stwellno: 13S15E18M001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000033013

Longitude: -120.3689
Latiude: 36.7967
Stwellno: 13S15E18J001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000033009

Longitude: -120.3086
Latiude: 36.7944
Stwellno: 13S15E14N001M
Districtco: 8
Welluseco: Z
Countyco: 20
Gwcode: 502207
Site id: CADW40000033000

Longitude: -120.3081
Latiude: 36.7939
Stwellno: 13S15E14P002M
Districtco: 8
Welluseco: Z
Countyco: 20
Gwcode: 502207
Site id: CADW40000032994

Longitude: -120.2883
Latiude: 36.7931
Stwellno: 13S15E24C001M
Districtco: 8
Welluseco: Z
Countyco: 20
Gwcode: 502207
Site id: CADW40000032972

Longitude: -120.3894
Latiude: 36.7908
Stwellno: 13S14E24A001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032949

Longitude: -120.3631
Latiude: 36.7897
Stwellno: 13S15E20D001M
Districtco: 8
Welluseco: Z
Countyco: 20
Gwcode: 502207
Site id: CADW40000032944

Longitude: -120.3569
Latiude: 36.7883
Stwellno: 13S15E20G002M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032935

Longitude: -120.3556
Latiude: 36.7883
Stwellno: 13S15E20G001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032934

Longitude: -120.3592
Latiude: 36.7853
Stwellno: 13S15E20L001M
Districtco: 8
Welluseco: Z
Countyco: 20
Gwcode: 502207
Site id: CADW40000032918

Longitude: -120.3803
Latiude: 36.7836
Stwellno: 13S15E19L001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032911

Longitude: -120.3367
Latiude: 36.7825
Stwellno: 13S15E21K001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032903

Longitude: -120.2703
Latiude: 36.7814
Stwellno: 13S16E19P001M
Districtco: 8
Welluseco: Z
Countyco: 20
Gwcode: 502206
Site id: CADW40000032894

Longitude: -120.3061
Latiude: 36.7811
Stwellno: 13S15E23P001M
Districtco: 8
Welluseco: Z
Countyco: 20
Gwcode: 502207
Site id: CADW40000032889

Longitude: -120.3367
Latiude: 36.7808
Stwellno: 13S15E21Q001M
Districtco: 8
Welluseco: Z
Countyco: 20
Gwcode: 502207
Site id: CADW40000032885

Longitude: -120.3708
Latiude: 36.7806
Stwellno: 13S15E19R001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032883

Longitude: -120.3858
Latiude: 36.78
Stwellno: 13S14E24R001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032880

Longitude: -120.3719
Latiude: 36.7797
Stwellno: 13S15E19Q001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032877

Longitude: -120.3714
Latiude: 36.7772
Stwellno: 13S15E30B007M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032817

Longitude: -120.3222
Latiude: 36.7769
Stwellno: 13S15E27C001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032816

Longitude: -120.3014
Latiude: 36.7769
Stwellno: 13S15E26B001M
Districtco: 8
Welluseco: Z
Countyco: 20
Gwcode: 502207
Site id: CADW40000032815

Longitude: -120.3753
Latiude: 36.7761
Stwellno: 13S15E30C001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032814

Longitude: -120.2644
Latiude: 36.7756
Stwellno: 13S16E30B001M
Districtco: 8
Welluseco: Z
Countyco: 20
Gwcode: 502206
Site id: CADW40000032810

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Longitude:	-120.2644
Latiude:	36.7756
Stwellno:	13S16E30B002M
Districtco:	8
Welluseco:	Z
Countyco:	20
Gwcode:	502206
Site id:	CADW40000032811

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Water Wells:

Water System Information:

Map ID:	51		
Prime Station Code:	13S/15E-30B04 M	User ID:	AGE
FRDS Number:	1010021003	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT/MUN/INTAKE
Water Type:	Well/Groundwater	Well Status:	Active Raw
Source Lat/Long:	364632.0 1202224.0	Precision:	1,000 Feet (10 Seconds)
Source Name:	WELL 03		
System Number:	1010021		
System Name:	CITY OF MENDOTA		
Organization That Operates System:			
	643 QUINCE STREET MENDOTA 93640		
Pop Served:	11000	Connections:	1362
Area Served:	MENDOTA		
Sample Collected:	05/11/2007	Findings:	94. PCI/L
Chemical:	GROSS ALPHA		
Sample Collected:	05/11/2007	Findings:	0.84 PCI/L
Chemical:	GROSS ALPHA COUNTING ERROR		
Sample Collected:	07/02/2007	Findings:	0.268 PCI/L
Chemical:	RADIUM 226 COUNTING ERROR		
Sample Collected:	07/02/2007	Findings:	0.425 PCI/L
Chemical:	RADIUM 226 MDA95		
Sample Collected:	07/02/2007	Findings:	4. PCI/L
Chemical:	GROSS ALPHA		
Sample Collected:	07/02/2007	Findings:	0.24 PCI/L
Chemical:	GROSS ALPHA COUNTING ERROR		
Sample Collected:	07/02/2007	Findings:	1.41 PCI/L
Chemical:	GROSS BETA COUNTING ERROR		
Sample Collected:	07/02/2007	Findings:	0.28 PCI/L
Chemical:	RADIUM 228 COUNTING ERROR		
Sample Collected:	07/02/2007	Findings:	1. PCI/L
Chemical:	RADIUM 228 MDA95		
Sample Collected:	10/10/2007	Findings:	0.22 PCI/L
Chemical:	RADIUM 226 COUNTING ERROR		
Sample Collected:	10/10/2007	Findings:	0.346 PCI/L
Chemical:	RADIUM 226 MDA95		
Sample Collected:	10/10/2007	Findings:	3.2 PCI/L
Chemical:	GROSS ALPHA		
Sample Collected:	10/10/2007	Findings:	0.19 PCI/L
Chemical:	GROSS ALPHA COUNTING ERROR		
Sample Collected:	10/10/2007	Findings:	1.09 PCI/L
Chemical:	GROSS BETA COUNTING ERROR		

Sample Collected:	10/10/2007	Findings:	0.43 PCI/L
Chemical:	RADIUM 228 COUNTING ERROR		
Sample Collected:	10/10/2007	Findings:	1. PCI/L
Chemical:	RADIUM 228 MDA95		
Sample Collected:	01/09/2008	Findings:	0.304 PCI/L
Chemical:	RADIUM 226 COUNTING ERROR		
Sample Collected:	01/09/2008	Findings:	0.477 PCI/L
Chemical:	RADIUM 226 MDA95		
Sample Collected:	01/09/2008	Findings:	0.23 PCI/L
Chemical:	GROSS ALPHA COUNTING ERROR		
Sample Collected:	01/09/2008	Findings:	1.06 PCI/L
Chemical:	GROSS BETA COUNTING ERROR		
Sample Collected:	01/09/2008	Findings:	0.34 PCI/L
Chemical:	RADIUM 228 COUNTING ERROR		
Sample Collected:	01/09/2008	Findings:	1. PCI/L
Chemical:	RADIUM 228 MDA95		
Sample Collected:	11/01/2010	Findings:	15. UNITS
Chemical:	COLOR		
Sample Collected:	11/01/2010	Findings:	3300. US
Chemical:	SPECIFIC CONDUCTANCE		
Sample Collected:	11/01/2010	Findings:	7.9
Chemical:	PH, LABORATORY		
Sample Collected:	11/01/2010	Findings:	212. MG/L
Chemical:	ALKALINITY (TOTAL) AS CACO3		
Sample Collected:	11/01/2010	Findings:	206. MG/L
Chemical:	BICARBONATE ALKALINITY		
Sample Collected:	11/01/2010	Findings:	356. MG/L
Chemical:	HARDNESS (TOTAL) AS CACO3		
Sample Collected:	11/01/2010	Findings:	72. MG/L
Chemical:	CALCIUM		
Sample Collected:	11/01/2010	Findings:	20. MG/L
Chemical:	MAGNESIUM		
Sample Collected:	11/01/2010	Findings:	580. MG/L
Chemical:	SODIUM		
Sample Collected:	11/01/2010	Findings:	5. MG/L
Chemical:	POTASSIUM		
Sample Collected:	11/01/2010	Findings:	460. MG/L
Chemical:	CHLORIDE		
Sample Collected:	11/01/2010	Findings:	690. MG/L
Chemical:	SULFATE		
Sample Collected:	11/01/2010	Findings:	0.19 MG/L
Chemical:	FLUORIDE (F) (NATURAL-SOURCE)		
Sample Collected:	11/01/2010	Findings:	2.3 UG/L
Chemical:	ARSENIC		

Sample Collected:	11/01/2010	Findings:	670. UG/L
Chemical:	IRON		
Sample Collected:	11/01/2010	Findings:	655. UG/L
Chemical:	MANGANESE		
Sample Collected:	11/01/2010	Findings:	159. UG/L
Chemical:	ZINC		
Sample Collected:	11/01/2010	Findings:	7.4 UG/L
Chemical:	SELENIUM		
Sample Collected:	11/01/2010	Findings:	1900. MG/L
Chemical:	TOTAL DISSOLVED SOLIDS		
Sample Collected:	11/01/2010	Findings:	0.37
Chemical:	LANGELIER INDEX AT SOURCE TEMP.		
Sample Collected:	11/01/2010	Findings:	3. NTU
Chemical:	TURBIDITY, LABORATORY		

Longitude:	-120.2792
Latiude:	36.7753
Stwellno:	13S15E25A002M
Districtco:	8
Welluseco:	Z
Countyco:	20
Gwcode:	502207
Site id:	CADW40000032805

Water System Information:

Map ID:	51		
Prime Station Code:	13S/15E-30B08 M	User ID:	AGE
FRDS Number:	1010021004	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT
Water Type:	Well/Groundwater	Well Status:	Active Raw
Source Lat/Long:	364631.0 1202225.0	Precision:	1,000 Feet (10 Seconds)
Source Name:	WELL 04		
System Number:	1010021		
System Name:	CITY OF MENDOTA		
Organization That Operates System:			
	643 QUINCE STREET		
	MENDOTA 93640		
Pop Served:	11000	Connections:	1362
Area Served:	MENDOTA		
Sample Collected:	05/04/2001	Findings:	260. MG/L
Chemical:	BICARBONATE ALKALINITY		

Longitude:	-120.2867
Latiude:	36.7739
Stwellno:	13S15E25F001M
Districtco:	8
Welluseco:	Z
Countyco:	20
Gwcode:	502207
Site id:	CADW40000032800

Longitude:	-120.3325
Latiude:	36.7736
Stwellno:	13S15E28H001M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032798

Longitude:	-120.3219
Latiude:	36.7736
Stwellno:	13S15E27F001M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032797

Longitude:	-120.3039
Latiude:	36.7731
Stwellno:	13S15E26G001M
Districtco:	8
Welluseco:	Z
Countyco:	20
Gwcode:	502207
Site id:	CADW40000032794

Longitude:	-120.2722
Latiude:	36.7731
Stwellno:	13S16E30E001M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502208
Site id:	CADW40000032793

Longitude:	-120.2992
Latiude:	36.7719
Stwellno:	13S15E26H001M
Districtco:	8
Welluseco:	Z
Countyco:	20
Gwcode:	502207
Site id:	CADW40000032788

Longitude:	-120.3361
Latiude:	36.7711
Stwellno:	13S15E28G001M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032778

Longitude:	-120.2675
Latiude:	36.7708
Stwellno:	13S16E30L002M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502208
Site id:	CADW40000032773

Longitude:	-120.3019
Latiude:	36.7706
Stwellno:	13S15E26K001M
Districtco:	8
Welluseco:	Z
Countyco:	20
Gwcode:	502207
Site id:	CADW40000032764

Longitude:	-120.2681
Latiude:	36.7706
Stwellno:	13S16E30L003M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502208
Site id:	CADW40000032763

Longitude: -120.29
Latiude: 36.7703
Stwellno: 13S15E25L001M
Districtco: 8
Welluseco: Z
Countyco: 20
Gwcode: 502207
Site id: CADW40000032760

Longitude: -120.2658
Latiude: 36.77
Stwellno: 13S16E30L001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502208
Site id: CADW40000032758

Longitude: -120.3814
Latiude: 36.7697
Stwellno: 13S15E30M001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032755

Longitude: -120.38
Latiude: 36.7675
Stwellno: 13S15E30L003M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032740

Longitude: -120.2658
Latiude: 36.7667
Stwellno: 13S16E30Q001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502208
Site id: CADW40000032737

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Water System Information:

Map ID:	76		
Prime Station Code:	13S/15E-30G01 M	User ID:	AGE
FRDS Number:	1010021002	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT/MUN/INTAKE/SUPPLY
Water Type:	Well/Groundwater	Well Status:	Active Raw
Source Lat/Long:	364600.0 1202200.0	Precision:	Undefined
Source Name:	WELL 02		
System Number:	1010021		
System Name:	CITY OF MENDOTA		
Organization That Operates System:			
	643 QUINCE STREET		
	MENDOTA 93640		
Pop Served:	11000	Connections:	1362
Area Served:	MENDOTA		

Water System Information:

Map ID:	76		
Prime Station Code:	13S/15E-30G02 M	User ID:	AGE
FRDS Number:	1010021001	County:	Fresno
District Number:	11	Station Type:	WELL/AMBNT/MUN/INTAKE/SUPPLY
Water Type:	Well/Groundwater	Well Status:	Destroyed
Source Lat/Long:	364600.0 1202200.0	Precision:	Undefined
Source Name:	WELL 01 - DESTROYED		
System Number:	1010021		
System Name:	CITY OF MENDOTA		
Organization That Operates System:			
	643 QUINCE STREET		
	MENDOTA 93640		
Pop Served:	11000	Connections:	1362
Area Served:	MENDOTA		

Longitude:	-120.2892
Latiude:	36.7658
Stwellno:	13S15E25P001M
Districtco:	8
Welluseco:	Z
Countyco:	20
Gwcode:	502207
Site id:	CADW40000032732

Longitude:	-120.2914
Latiude:	36.7647
Stwellno:	13S15E25N001M
Districtco:	8
Welluseco:	Z
Countyco:	20
Gwcode:	502207
Site id:	CADW40000032728

Longitude:	-120.2931
Latiude:	36.7642
Stwellno:	13S15E25N002M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032716

Longitude:	-120.3225
Latiude:	36.7639
Stwellno:	13S15E27P001M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032708

Longitude:	-120.3225
Latiude:	36.7634
Stwellno:	13S15E34C002M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032697

Longitude:	-120.3225
Latiude:	36.7633
Stwellno:	13S15E34C001M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032687

Longitude:	-120.2861
Latiude:	36.7631
Stwellno:	13S15E36C001M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032677

Longitude: -120.2861
Latiude: 36.7631
Stwellno: 13S15E36C002M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502206
Site id: CADW40000032678

Longitude: -120.2847
Latiude: 36.7631
Stwellno: 13S15E36B001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032675

Longitude: -120.2847
Latiude: 36.7631
Stwellno: 13S15E36B002M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502206
Site id: CADW40000032676

Longitude: -120.3128
Latiude: 36.7603
Stwellno: 13S15E35D005M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032667

Longitude: -120.3128
Latiude: 36.7603
Stwellno: 13S15E35D003M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032666

Longitude:	-120.3128
Latiude:	36.7603
Stwellno:	13S15E35D001M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032664

Longitude:	-120.3128
Latiude:	36.7603
Stwellno:	13S15E35D002M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032665

Longitude:	-120.3128
Latiude:	36.7602
Stwellno:	13S15E35F001M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032663

Longitude:	-120.3136
Latiude:	36.76
Stwellno:	13S15E34A001M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032661

Longitude:	-120.3239
Latiude:	36.7561
Stwellno:	13S15E34L001M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032629

Longitude: -120.3211
Latiude: 36.7561
Stwellno: 13S15E34K003M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032628

Longitude: -120.3175
Latiude: 36.7561
Stwellno: 13S15E34J003M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032626

Longitude: -120.3175
Latiude: 36.7561
Stwellno: 13S15E34J004M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032627

Longitude: -120.3139
Latiude: 36.7561
Stwellno: 13S15E34J002M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032625

Longitude: -120.3139
Latiude: 36.7561
Stwellno: 13S15E34J001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032624

Longitude: -120.3175
Latiude: 36.7539
Stwellno: 13S15E34J005M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032613

Longitude: -120.3175
Latiude: 36.7539
Stwellno: 13S15E34J006M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032614

Longitude: -120.3194
Latiude: 36.7525
Stwellno: 13S15E34R001M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032605

Longitude: -120.3194
Latiude: 36.7525
Stwellno: 13S15E34R002M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032604

Longitude: -120.3514
Latiude: 36.7489
Stwellno: 14S15E05A002M
Districtco: 8
Welluseco: Z
Countyco: 10
Gwcode: 502207
Site id: CADW40000032539

Longitude:	-120.3178
Latiude:	36.7486
Stwellno:	14S15E03A004M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032530

Longitude:	-120.3178
Latiude:	36.7486
Stwellno:	14S15E03A003M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032529

Longitude:	-120.3508
Latiude:	36.7472
Stwellno:	14S15E05A006M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032521

Longitude:	-120.3508
Latiude:	36.7472
Stwellno:	14S15E05A003M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032520

Longitude:	-120.3508
Latiude:	36.7467
Stwellno:	14S15E05A004M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032518

Longitude:	-120.3164
Latiude:	36.7456
Stwellno:	14S15E03A001M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032513

Longitude:	-120.3508
Latiude:	36.7453
Stwellno:	14S15E05A005M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032509

Longitude:	-120.3164
Latiude:	36.745
Stwellno:	14S15E03H001M
Districtco:	8
Welluseco:	Z
Countyco:	10
Gwcode:	502207
Site id:	CADW40000032505

GEOCHECK VERSION 2.1
STATE DATABASE WELL INFORMATION

Oil/Gas Well Information:

Map ID:	1		
Apinumber:	03900037	District:	5
Geodistric:	0	Statuscode:	006
Gissourcec:	HUD	Wellsymbol:	DH
Confidenti:	Not Reported	Countyname:	Madera
Leasename:	Gill Ranch		
Wellnumber:	23-24		
Operatorna:	Coast-Parker, Inc.		
Fieldname:	Gill Ranch Gas	Areaname:	Any Area
Section:	24	Township:	13S
Range:	15E	Basemeridi:	MD
Lat83:	36.78851089		
Long83:	-120.29223903		
Site id:	CAOG70000193193		

Map ID:	2		
Apinumber:	03920010	District:	5
Geodistric:	0	Statuscode:	006
Gissourcec:	HUD	Wellsymbol:	DH
Confidenti:	Not Reported	Countyname:	Madera
Leasename:	Neaves-Gill		
Wellnumber:	1		
Operatorna:	Neaves Petro. Developments		
Fieldname:	Gill Ranch Gas	Areaname:	Any Area
Section:	24	Township:	13S
Range:	15E	Basemeridi:	MD
Lat83:	36.78816983		
Long83:	-120.2820877		
Site id:	CAOG70000193190		

Map ID:	3		
Apinumber:	01921281	District:	5
Geodistric:	0	Statuscode:	006
Gissourcec:	HUD	Wellsymbol:	DH
Confidenti:	Not Reported	Countyname:	Fresno
Leasename:	DEM		
Wellnumber:	2		
Operatorna:	D. J. Pickrell, Oper.		
Fieldname:	Any Field	Areaname:	Any Area
Section:	21	Township:	13S
Range:	15E	Basemeridi:	MD

Lat83:	36.78320828
Long83:	-120.34398447
Site id:	CAOG70000193171

Map ID:	4		
Apinumber:	03920045	District:	5
Geodistric:	0	Statuscode:	006
Gissourcec:	HUD	Wellsymbol:	DH
Confidenti:	Not Reported	Countyname:	Madera
Leasename:	Getty Agri Bus		
Wellnumber:	A-1		
Operatorna:	Phillips Petro. Co.		
Fieldname:	Gill Ranch Gas	Areaname:	Any Area
Section:	19	Township:	13S
Range:	16E	Basemeridi:	MD
Lat83:	36.78236584		
Long83:	-120.27026718		
Site id:	CAOG70000193168		

Map ID:	5		
Apinumber:	01921173	District:	5
Geodistric:	0	Statuscode:	006
Gissourcec:	HUD	Wellsymbol:	DH
Confidenti:	Not Reported	Countyname:	Fresno
Leasename:	DEM		
Wellnumber:	1		
Operatorna:	D. J. Pickrell, Oper.		
Fieldname:	Any Field	Areaname:	Any Area
Section:	29	Township:	13S
Range:	15E	Basemeridi:	MD
Lat83:	36.77650545		
Long83:	-120.3545646		
Site id:	CAOG70000193159		

Map ID:	6		
Apinumber:	01920752	District:	5
Geodistric:	0	Statuscode:	006
Gissourcec:	HUD	Wellsymbol:	DH
Confidenti:	Not Reported	Countyname:	Fresno
Leasename:	B.B. CO.		
Wellnumber:	1		
Operatorna:	Atlantic Richfield Co.		
Fieldname:	Any Field	Areaname:	Any Area
Section:	28	Township:	13S
Range:	15E	Basemeridi:	MD

Lat83:	36.77443136
Long83:	-120.33466193
Site id:	CAOG70000193157

Map ID:	7		
Apinumber:	01906007	District:	5
Geodistric:	0	Statuscode:	006
Gissourcec:	HUD	Wellsymbol:	DH
Confidenti:	Not Reported	Countyname:	Fresno
Leasename:	Matheson		
Wellnumber:	1		
Operatorna:	Donco Co.		
Fieldname:	Any Field	Areaname:	Any Area
Section:	32	Township:	13S
Range:	15E	Basemeridi:	MD
Lat83:	36.76324274		
Long83:	-120.36796062		
Site id:	CAOG70000193152		

Map ID:	8		
Apinumber:	01922584	District:	5
Geodistric:	0	Statuscode:	006
Gissourcec:	HUD	Wellsymbol:	DH
Confidenti:	Not Reported	Countyname:	Fresno
Leasename:	Amstar		
Wellnumber:	1		
Operatorna:	Gamma Corp.		
Fieldname:	Any Field	Areaname:	Any Area
Section:	5	Township:	14S
Range:	15E	Basemeridi:	MD
Lat83:	36.73632695		
Long83:	-120.3589204		
Site id:	CAOG70000193134		

GEOCHECK VERSION 2.1
PUBLIC WATER SUPPLY SYSTEM INFORMATION

PWS SUMMARY:

Map ID:	96		
PWS ID:	CA1000101		
Date Initiated:	7706	Date Deactivated:	Not Reported
PWS Name:	CALIF DEPT OF FISH & GAME CALIF DEPT OF FISH & GAME SANTA FE GRADE MENDOTA, CA 93640		
Addressee / Facility:	System Owner/Responsible Party CALIF DEPT OF FISH & GAME P O BOX ??? MENDOTA, CA 93640		
Facility Latitude:	36 45 12	Facility Longitude:	120 22 50
City Served:	Not Reported		
Treatment Class:	Untreated	Population:	00000025

Violations information not reported.

CALIFORNIA GOVERNMENT WELL RECORDS SEARCHED

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

State Database: CA Radon
Source: Department of Health Services
Telephone: 916-324-2208
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Health Services
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779
Oil and Gas well locations in the state.

STREET AND ADDRESS INFORMATION

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EDR DataMap®
Well Search

San Joaquin River Restoration Project Alternatives

- Listed Water Wells
- Oil & Gas Wells
- Study Boundary
- Roads
- Major Roads
- Waterways
- Railroads
- Contour Lines
- Fault Lines
- Water
- Superfund Sites
- 100-Yr Flood Zones
- Wetlands

Mendota, CA

0 1/2 1

Scale in Miles

EDR Environmental Data Resources, Inc

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3196001.1w - 01 Dec 11

Mendota Pool Bypass and Reach 2B Improvements Project

Appendix 22-A

Draft
Environmental Impact Statement/Report

SAN JOAQUIN RIVER
RESTORATION PROGRAM

Draft
June 2015

Prepared by NDS/ATD

VOLUME

Ripperdan Ave S/o Firebaugh Ave

Day: Wednesday
Date: 8/31/2011

City: Firebaugh
Project #: CA11_8043_001

DAILY TOTALS	NB	SB	EB	WB	Total
	1,613	1,484	0	0	3,097

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	2		2				4		12:00	22		22				44	
00:15	1		1				2		12:15	11		14				25	
00:30	1		5				6		12:30	15		21				36	
00:45	3	7	6	14			9	21	12:45	29	77	24	81			53	158
01:00	2		4				6		13:00	22		11				33	
01:15	4		3				7		13:15	19		23				42	
01:30	3		3				6		13:30	23		25				48	
01:45	6	15	2	12			8	27	13:45	14	78	26	85			40	163
02:00	11		1				12		14:00	21		23				44	
02:15	9		2				11		14:15	29		25				54	
02:30	1		5				6		14:30	20		18				38	
02:45	3	24	6	14			9	38	14:45	26	96	32	98			58	194
03:00	5		11				16		15:00	22		23				45	
03:15	1		3				4		15:15	19		34				53	
03:30	0		3				3		15:30	15		29				44	
03:45	1	7	6	23			7	30	15:45	24	80	25	111			49	191
04:00	8		3				11		16:00	24		33				57	
04:15	3		6				9		16:15	31		26				57	
04:30	4		9				13		16:30	20		25				45	
04:45	13	28	6	24			19	52	16:45	29	104	28	112			57	216
05:00	14		18				32		17:00	23		27				50	
05:15	17		11				28		17:15	26		30				56	
05:30	21		18				39		17:30	23		26				49	
05:45	34	86	26	73			60	159	17:45	24	96	22	105			46	201
06:00	35		11				46		18:00	30		17				47	
06:15	26		14				40		18:15	37		22				59	
06:30	22		14				36		18:30	18		12				30	
06:45	33	116	16	55			49	171	18:45	16	101	13	64			29	165
07:00	21		32				53		19:00	31		14				45	
07:15	29		16				45		19:15	17		11				28	
07:30	32		20				52		19:30	25		11				36	
07:45	35	117	23	91			58	208	19:45	14	87	9	45			23	132
08:00	26		23				49		20:00	13		16				29	
08:15	28		23				51		20:15	10		16				26	
08:30	18		22				40		20:30	17		14				31	
08:45	16	88	18	86			34	174	20:45	12	52	4	50			16	102
09:00	24		21				45		21:00	14		5				19	
09:15	36		28				64		21:15	8		4				12	
09:30	15		26				41		21:30	10		4				14	
09:45	21	96	23	98			44	194	21:45	7	39	6	19			13	58
10:00	16		34				50		22:00	8		8				16	
10:15	22		15				37		22:15	15		4				19	
10:30	17		30				47		22:30	12		5				17	
10:45	15	70	20	99			35	169	22:45	11	46	8	25			19	71
11:00	21		20				41		23:00	7		1				8	
11:15	16		21				37		23:15	3		2				5	
11:30	16		23				39		23:30	8		4				12	
11:45	27	80	27	91			54	171	23:45	5	23	2	9			7	32
TOTALS		734		680				1414	TOTALS		879		804				1683
SPLIT %		51.9%		48.1%				45.7%	SPLIT %		52.2%		47.8%				54.3%

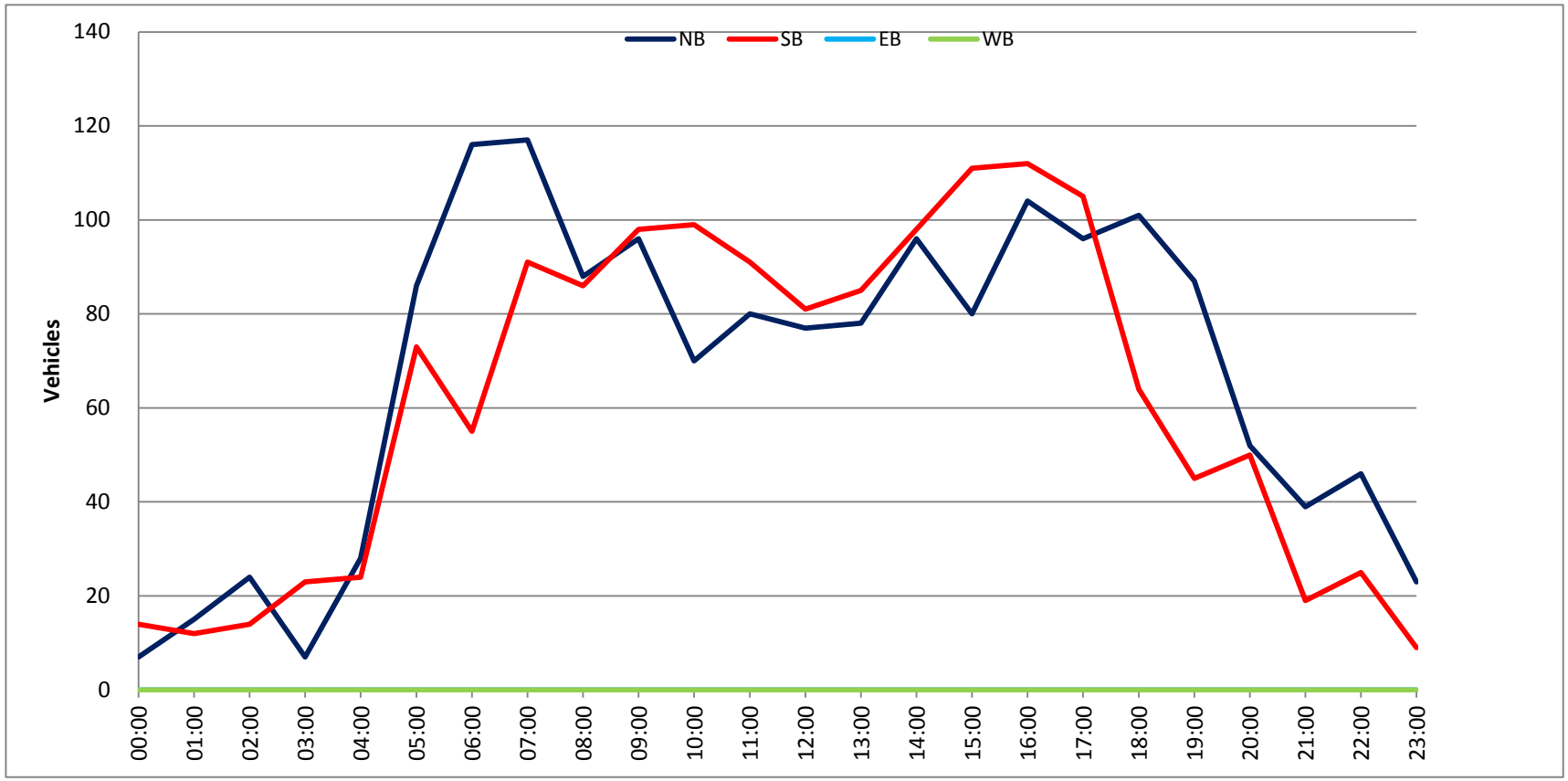
DAILY TOTALS	NB	SB	EB	WB	Total
	1,613	1,484	0	0	3,097

AM Peak Hour	07:15	09:15			07:30	PM Peak Hour	17:30	15:15			16:00
AM Pk Volume	122	111			210	PM Pk Volume	114	121			216
Pk Hr Factor	0.871	0.816			0.905	Pk Hr Factor	0.770	0.890			0.947
7 - 9 Volume	205	177	0	0	382	4 - 6 Volume	200	217	0	0	417
7 - 9 Peak Hour	07:15	07:00			07:30	4 - 6 Peak Hour	16:00	16:00			16:00
7 - 9 Pk Volume	122	91	0	0	210	4 - 6 Pk Volume	104	112	0	0	216
Pk Hr Factor	0.871	0.711	0.000	0.000	0.905	Pk Hr Factor	0.839	0.848	0.000	0.000	0.947

Prepared by NDS/ATD

Project #: CA11_8043_001 **City:** Firebaugh

Location: Ripperdan Ave S/o Firebaugh Ave **Date:** 8/31/2011



Prepared by NDS/ATD

VOLUME

Firebaugh Ave E/o Ripperdan Ave

Day: Wednesday
Date: 8/31/2011

City: Firebaugh
Project #: CA11_8043_002

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	1,496	1,543	3,039

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00			2		4		6		12:00			38		20		58	
00:15			6		3		9		12:15			32		12		44	
00:30			0		2		2		12:30			29		26		55	
00:45			4	12	1	10	5	22	12:45			26	125	28	86	54	211
01:00			1		1		2		13:00			19		16		35	
01:15			1		1		2		13:15			20		17		37	
01:30			3		6		9		13:30			27		18		45	
01:45			1	6	2	10	3	16	13:45			15	81	17	68	32	149
02:00			6		6		12		14:00			20		22		42	
02:15			1		19		20		14:15			20		18		38	
02:30			5		6		11		14:30			19		36		55	
02:45			1	13	0	31	1	44	14:45			20	79	29	105	49	184
03:00			1		3		4		15:00			19		16		35	
03:15			4		2		6		15:15			23		21		44	
03:30			1		2		3		15:30			23		16		39	
03:45			2	8	2	9	4	17	15:45			40	105	17	70	57	175
04:00			0		6		6		16:00			54		21		75	
04:15			3		17		20		16:15			43		22		65	
04:30			2		19		21		16:30			54		28		82	
04:45			5	10	19	61	24	71	16:45			39	190	21	92	60	282
05:00			11		36		47		17:00			30		31		61	
05:15			9		42		51		17:15			41		36		77	
05:30			13		71		84		17:30			22		30		52	
05:45			33	66	34	183	67	249	17:45			15	108	25	122	40	230
06:00			23		23		46		18:00			15		26		41	
06:15			21		20		41		18:15			23		26		49	
06:30			12		21		33		18:30			21		18		39	
06:45			15	71	16	80	31	151	18:45			17	76	13	83	30	159
07:00			17		17		34		19:00			23		8		31	
07:15			9		21		30		19:15			10		11		21	
07:30			37		15		52		19:30			14		15		29	
07:45			16	79	25	78	41	157	19:45			11	58	12	46	23	104
08:00			22		12		34		20:00			9		16		25	
08:15			24		23		47		20:15			6		19		25	
08:30			15		20		35		20:30			7		9		16	
08:45			10	71	22	77	32	148	20:45			4	26	10	54	14	80
09:00			21		15		36		21:00			5		8		13	
09:15			14		8		22		21:15			8		5		13	
09:30			19		13		32		21:30			7		6		13	
09:45			25	79	20	56	45	135	21:45			2	22	7	26	9	48
10:00			20		14		34		22:00			1		9		10	
10:15			19		14		33		22:15			4		8		12	
10:30			25		21		46		22:30			5		8		13	
10:45			15	79	21	70	36	149	22:45			5	15	12	37	17	52
11:00			18		12		30		23:00			3		13		16	
11:15			24		21		45		23:15			8		1		9	
11:30			17		12		29		23:30			10		1		11	
11:45			35	94	25	70	60	164	23:45			2	23	4	19	6	42
TOTALS				588		735		1323	TOTALS				908		808		1716
SPLIT %				44.4%		55.6%		43.5%	SPLIT %				52.9%		47.1%		56.5%

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	1,496	1,543	3,039

AM Peak Hour			11:45	05:00	05:00	PM Peak Hour			15:45	17:00	16:00
AM Pk Volume			134	183	249	PM Pk Volume			191	122	282
Pk Hr Factor			0.882	0.644	0.741	Pk Hr Factor			0.884	0.847	0.860
7 - 9 Volume	0	0	150	155	305	4 - 6 Volume	0	0	298	214	512
7 - 9 Peak Hour			07:30	07:45	07:30	4 - 6 Peak Hour			16:00	17:00	16:00
7 - 9 Pk Volume	0	0	99	80	174	4 - 6 Pk Volume	0	0	190	122	282
Pk Hr Factor	0.000	0.000	0.669	0.800	0.837	Pk Hr Factor	0.000	0.000	0.880	0.847	0.860

Prepared by NDS/ATD

Project #: CA11_8043_002 **City:** Firebaugh

Location: Firebaugh Ave E/o Ripperdan Ave **Date:** 8/31/2011

Prepared by NDS/ATD

VOLUME

Firebaugh Ave W/o Ripperdan Ave

Day: Wednesday
Date: 8/31/2011

City: Firebaugh
Project #: CA11_8043_003

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	2,684	2,776	5,460

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
00:00					4		6		10		12:00					53		48		101	
00:15					6		4		10		12:15					47		19		66	
00:30					5		3		8		12:30					41		35		76	
00:45					8	23	3	16	11	39	12:45					42	183	51	153	93	336
01:00					5		3		8		13:00					23		29		52	
01:15					4		6		10		13:15					41		31		72	
01:30					6		8		14		13:30					43		34		77	
01:45					3	18	8	25	11	43	13:45					34	141	29	123	63	264
02:00					7		14		21		14:00					39		37		76	
02:15					4		29		33		14:15					40		47		87	
02:30					8		5		13		14:30					38		46		84	
02:45					6	25	4	52	10	77	14:45					47	164	49	179	96	343
03:00					12		7		19		15:00					35		24		59	
03:15					6		2		8		15:15					48		33		81	
03:30					6		2		8		15:30					44		25		69	
03:45					7	31	3	14	10	45	15:45					61	188	34	116	95	304
04:00					3		13		16		16:00					71		36		107	
04:15					9		20		29		16:15					65		50		115	
04:30					10		21		31		16:30					71		41		112	
04:45					14	36	28	82	42	118	16:45					53	260	42	169	95	429
05:00					19		39		58		17:00					59		47		106	
05:15					25		56		81		17:15					62		57		119	
05:30					27		83		110		17:30					46		51		97	
05:45					45	116	53	231	98	347	17:45					39	206	37	192	76	398
06:00					27		48		75		18:00					25		49		74	
06:15					28		38		66		18:15					42		55		97	
06:30					23		41		64		18:30					35		33		68	
06:45					24	102	39	166	63	268	18:45					31	133	28	165	59	298
07:00					39		31		70		19:00					28		37		65	
07:15					27		48		75		19:15					22		22		44	
07:30					48		34		82		19:30					25		40		65	
07:45					33	147	56	169	89	316	19:45					16	91	25	124	41	215
08:00					42		25		67		20:00					23		26		49	
08:15					33		40		73		20:15					23		26		49	
08:30					33		37		70		20:30					22		12		34	
08:45					29	137	34	136	63	273	20:45					21	89	8	72	29	161
09:00					37		37		74		21:00					11		31		42	
09:15					44		43		87		21:15					10		17		27	
09:30					44		29		73		21:30					9		16		25	
09:45					41	166	36	145	77	311	21:45					10	40	16	80	26	120
10:00					50		24		74		22:00					7		15		22	
10:15					27		34		61		22:15					9		22		31	
10:30					49		33		82		22:30					9		20		29	
10:45					25	151	25	116	50	267	22:45					11	36	17	74	28	110
11:00					31		29		60		23:00					3		21		24	
11:15					45		36		81		23:15					10		4		14	
11:30					37		20		57		23:30					11		8		19	
11:45					59	172	45	130	104	302	23:45					5	29	14	47	19	76
TOTALS						1124		1282		2406	TOTALS						1560		1494		3054
SPLIT %						46.7%		53.3%		44.1%	SPLIT %						51.1%		48.9%		55.9%

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	2,684	2,776	5,460

AM Peak Hour			11:45	05:15	05:15	PM Peak Hour			15:45	16:45	16:30
AM Pk Volume			200	240	364	PM Pk Volume			268	197	432
Pk Hr Factor			0.847	0.723	0.827	Pk Hr Factor			0.944	0.864	0.908
7 - 9 Volume	0	0	284	305	589	4 - 6 Volume	0	0	466	361	827
7 - 9 Peak Hour			07:30	07:00	07:00	4 - 6 Peak Hour			16:00	16:45	16:30
7 - 9 Pk Volume	0	0	156	169	316	4 - 6 Pk Volume	0	0	260	197	432
Pk Hr Factor	0.000	0.000	0.813	0.754	0.888	Pk Hr Factor	0.000	0.000	0.915	0.864	0.908

Prepared by NDS/ATD

Project #: CA11_8043_003 **City:** Firebaugh

Location: Firebaugh Ave W/o Ripperdan Ave **Date:** 8/31/2011

Prepared by NDS/ATD

VOLUME

Bass Ave near Delta/Mendota Canal

Day: Wednesday
Date: 8/31/2011

City: Firebaugh
Project #: CA11_8043_004

DAILY TOTALS	NB	SB	EB	WB	Total
	258	252	0	0	510

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
00:00	0		0						0		12:00	2		4						6	
00:15	0		2						2		12:15	5		4						9	
00:30	0		0						0		12:30	2		3						5	
00:45	0		0	2					0	2	12:45	3	12	2	13					5	25
01:00	1		1						2		13:00	6		4						10	
01:15	0		0						0		13:15	5		3						8	
01:30	0		4						4		13:30	3		3						6	
01:45	0	1	0	5					0	6	13:45	4	18	3	13					7	31
02:00	0		0						0		14:00	8		4						12	
02:15	0		0						0		14:15	3		3						6	
02:30	0		0						0		14:30	2		4						6	
02:45	0		0						0		14:45	2	15	5	16					7	31
03:00	0		0						0		15:00	5		3						8	
03:15	0		0						0		15:15	4		2						6	
03:30	0		0						0		15:30	9		8						17	
03:45	0		0						0		15:45	6	24	4	17					10	41
04:00	0		0						0		16:00	6		5						11	
04:15	0		0						0		16:15	5		5						10	
04:30	0		0						0		16:30	3		3						6	
04:45	0		0						0		16:45	7	21	3	16					10	37
05:00	0		0						0		17:00	9		4						13	
05:15	2		2						4		17:15	2		5						7	
05:30	1		3						4		17:30	5		2						7	
05:45	0	3	0	5					0	8	17:45	6	22	6	17					12	39
06:00	3		0						3		18:00	5		8						13	
06:15	4		0						4		18:15	12		3						15	
06:30	0		1						1		18:30	10		5						15	
06:45	1	8	1	2					2	10	18:45	9	36	6	22					15	58
07:00	4		3						7		19:00	7		11						18	
07:15	3		3						6		19:15	7		7						14	
07:30	2		3						5		19:30	6		13						19	
07:45	2	11	0	9					2	20	19:45	5	25	7	38					12	63
08:00	3		1						4		20:00	5		9						14	
08:15	1		3						4		20:15	2		8						10	
08:30	1		5						6		20:30	1		3						4	
08:45	3	8	2	11					5	19	20:45	2	10	4	24					6	34
09:00	1		2						3		21:00	2		2						4	
09:15	1		5						6		21:15	1		2						3	
09:30	2		3						5		21:30	3		3						6	
09:45	4	8	1	11					5	19	21:45	0	6	1	8					1	14
10:00	3		0						3		22:00	1		1						2	
10:15	4		1						5		22:15	2		0						2	
10:30	5		3						8		22:30	1		2						3	
10:45	0	12	3	7					3	19	22:45	2	6	1	4					3	10
11:00	2		3						5		23:00	1		2						3	
11:15	4		2						6		23:15	0		0						0	
11:30	2		1						3		23:30	0		0						0	
11:45	3	11	3	9					6	20	23:45	0	1	1	3					1	4
TOTALS		62		61						123	TOTALS		196		191						387
SPLIT %		50.4%		49.6%						24.1%	SPLIT %		50.6%		49.4%						75.9%

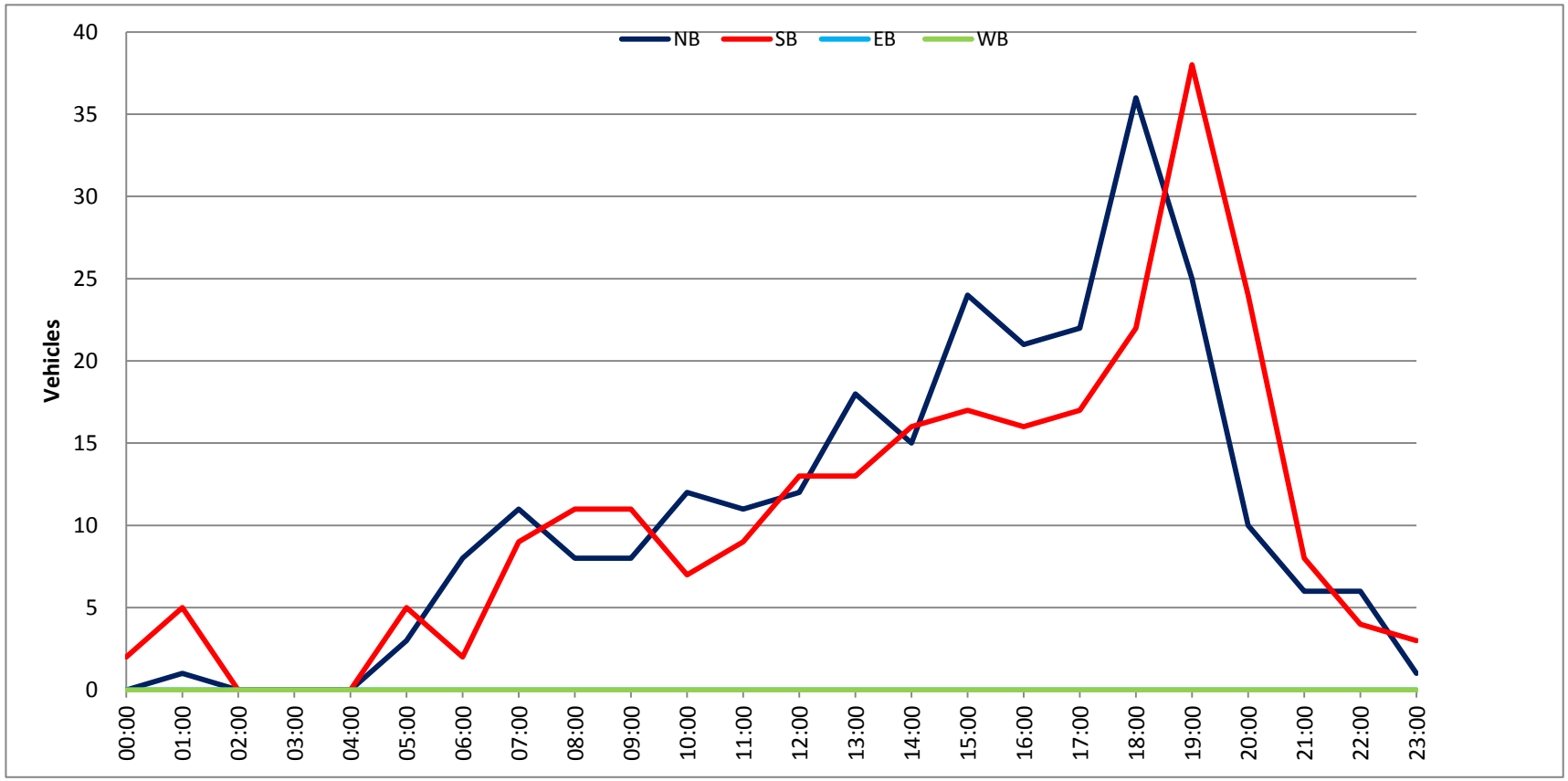
DAILY TOTALS	NB	SB	EB	WB	Total
	258	252	0	0	510

AM Peak Hour	09:45	08:30			11:45	PM Peak Hour	18:15	19:00			18:45
AM Pk Volume	16	14			26	PM Pk Volume	38	38			66
Pk Hr Factor	0.800	0.700			0.722	Pk Hr Factor	0.792	0.731			0.868
7 - 9 Volume	19	20	0	0	39	4 - 6 Volume	43	33	0	0	76
7 - 9 Peak Hour	07:00	08:00			07:00	4 - 6 Peak Hour	16:15	17:00			16:15
7 - 9 Pk Volume	11	11	0	0	20	4 - 6 Pk Volume	24	17	0	0	39
Pk Hr Factor	0.688	0.550	0.000	0.000	0.714	Pk Hr Factor	0.667	0.708	0.000	0.000	0.750

Prepared by NDS/ATD

Project #: CA11_8043_004 **City:** Firebaugh

Location: Bass Ave near Delta/Mendota Canal **Date:** 8/31/2011



Prepared by NDS/ATD

VOLUME

San Mateo Ave N/o SR-180

Day: Wednesday
Date: 8/31/2011

City: Firebaugh
Project #: CA11_8043_005

DAILY TOTALS	NB	SB	EB	WB	Total
	278	269	0	0	547

AM Period	NB		SB		EB		WB		TOTAL	
00:00	0		0						0	
00:15	3		0						3	
00:30	0		0						0	
00:45	0	3	0						0	3
01:00	0		1						1	
01:15	0		0						0	
01:30	0		1						1	
01:45	0		0	2					0	2
02:00	0		0						0	
02:15	0		0						0	
02:30	0		0						0	
02:45	1	1	0						1	1
03:00	0		0						0	
03:15	0		0						0	
03:30	0		0						0	
03:45	3	3	2	2					5	5
04:00	0		0						0	
04:15	0		0						0	
04:30	1		0						1	
04:45	0	1	0						0	1
05:00	0		0						0	
05:15	0		0						0	
05:30	0		5						5	
05:45	0		13	18					13	18
06:00	2		11						13	
06:15	0		5						5	
06:30	2		3						5	
06:45	3	7	1	20					4	27
07:00	0		1						1	
07:15	3		4						7	
07:30	5		3						8	
07:45	5	13	3	11					8	24
08:00	4		0						4	
08:15	4		5						9	
08:30	3		6						9	
08:45	5	16	2	13					7	29
09:00	2		4						6	
09:15	2		4						6	
09:30	1		2						3	
09:45	7	12	1	11					8	23
10:00	4		9						13	
10:15	9		1						10	
10:30	11		1						12	
10:45	8	32	4	15					12	47
11:00	4		10						14	
11:15	6		0						6	
11:30	3		9						12	
11:45	10	23	5	24					15	47
TOTALS		111		116						**227**
SPLIT %		48.9%		51.1%						**41.5%**

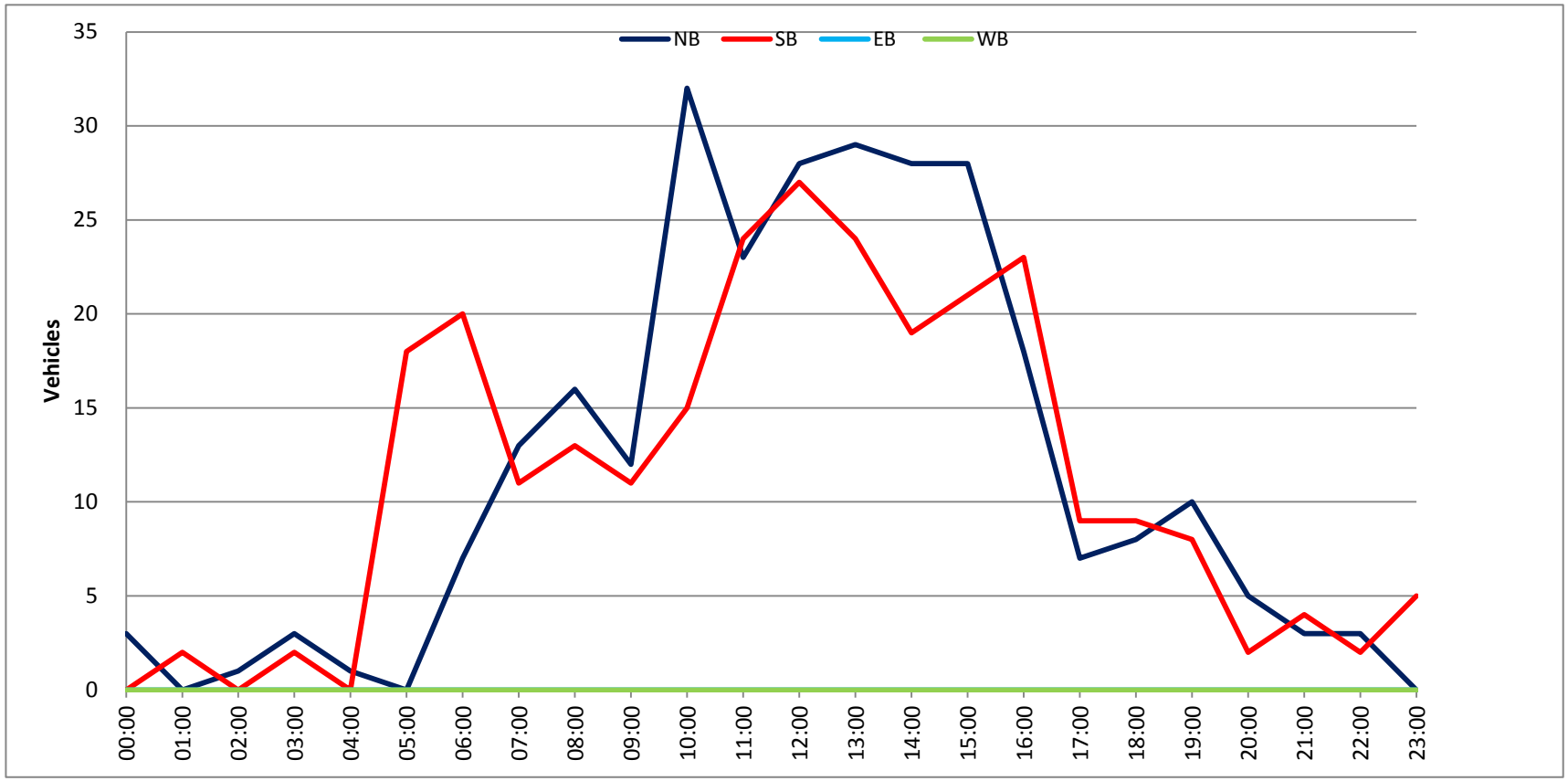
PM Period	NB		SB		EB		WB		TOTAL	
12:00	7		11						18	
12:15	6		3						9	
12:30	11		5						16	
12:45	4	28	8	27					12	55
13:00	6		7						13	
13:15	5		6						11	
13:30	12		2						14	
13:45	6	29	9	24					15	53
14:00	8		6						14	
14:15	8		7						15	
14:30	8		3						11	
14:45	4	28	3	19					7	47
15:00	3		8						11	
15:15	7		3						10	
15:30	8		6						14	
15:45	10	28	4	21					14	49
16:00	6		7						13	
16:15	6		5						11	
16:30	4		7						11	
16:45	2	18	4	23					6	41
17:00	3		2						5	
17:15	2		2						4	
17:30	1		1						2	
17:45	1	7	4	9					5	16
18:00	3		3						6	
18:15	2		3						5	
18:30	1		1						2	
18:45	2	8	2	9					4	17
19:00	1		4						5	
19:15	7		1						8	
19:30	1		1						2	
19:45	1	10	2	8					3	18
20:00	2		0						2	
20:15	2		1						3	
20:30	1		1						2	
20:45	0	5	0	2					0	7
21:00	0		0						0	
21:15	1		1						2	
21:30	2		2						4	
21:45	0	3	1	4					1	7
22:00	1		1						2	
22:15	0		0						0	
22:30	2		0						2	
22:45	0	3	1	2					1	5
23:00	0		5						5	
23:15	0		0						0	
23:30	0		0						0	
23:45	0		0	5					0	5
TOTALS		167		153						**320**
SPLIT %		52.2%		47.8%						**58.5%**

DAILY TOTALS	NB	SB	EB	WB	Total
	278	269	0	0	547

AM Peak Hour	11:45	05:30			**11:45**
AM Pk Volume	34	34			**58**
Pk Hr Factor	0.773	0.654			**0.806**
7 - 9 Volume	29	24	0	0	**53**
7 - 9 Peak Hour	07:30	07:45			**07:45**
7 - 9 Pk Volume	18	14	0	0	**30**
Pk Hr Factor	0.900	0.583	0.000	0.000	**0.833**

PM Peak Hour	13:30	12:00			**13:30**
PM Pk Volume	34	27			**58**
Pk Hr Factor	0.708	0.614			**0.967**
4 - 6 Volume	25	32	0	0	**57**
4 - 6 Peak Hour	16:00	16:00			**16:00**
4 - 6 Pk Volume	18	23	0	0	**41**
Pk Hr Factor	0.750	0.821	0.000	0.000	**0.788**

Prepared by NDS/ATD

Project #: CA11_8043_005 **City:** Firebaugh

Location: San Mateo Ave N/o SR-180 **Date:** 8/31/2011