US Army Corps
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Sacramento District

FINAL

Environmental Impact Statement

for the

Truckee Meadows Flood Control Project

Nevada

General Reevaluation Report

Volume I – Final Environmental Impact Statement

prepared by

U.S. Army Corps of Engineers
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Truckee Meadows Flood Control Project, Nevada
General Reevaluation Report

Lead Agency:	**U.S. Army Corps of Engineers**
Responsible Official:	**Colonel Michael J. Ferrell, District Engineer** **Sacramento District** **1325 J Street** **Sacramento, CA 95814**
For Information Contact:	**Tyler M. Stalker** **Sacramento District** **Public Affairs Office** **1325 J Street** **Sacramento, CA 95814** **Phone: (916) 557-5100** **Email: spk-pao@usace.army.mil**

Abstract

Pursuant to the National Environmental Policy Act of 1969, as amended, the U.S. Army Corps of Engineers, Sacramento District has prepared this Environmental Impact Statement (EIS) for the Federal action proposed to reevaluate the Truckee Meadows Flood Control Project, Nevada, authorized under the Water Resources Development Act (WRDA) of 1988 (Public Law 100-676) to reduce the risk of flooding in the Reno-Sparks Metropolitan area of Nevada. The authorized project also included recreation and fish and wildlife enhancement features. The authorized project was deferred in 1992 during the Pre-construction Engineering and Design phase when changes in real estate costs made the project economically infeasible.

This EIS identifies, evaluates, and documents the environmental effects of an array of flood risk management and recreation alternatives that meet Federal water resources project planning guidelines and reduce the risk of flooding in the Truckee Meadows area, in addition to providing recreational benefits to the Truckee Meadows area. Implementing the recommended project would represent a large and complex construction effort that involves construction of levees, floodwalls, floodplain terraces, scour protection, and environmentally sustainable design features over an anticipated multi-year construction period. This EIS allows opportunity for the public and review agencies to provide comments and helps ensure that implementation of this project can be achieved with the least possible environmental effects.

A 45-day public review period for the draft EIS began with the publication of the Environmental Protection Agency's Notice of Availability in the *Federal Register* on May 24, 2013. All comments received during the review period were considered in the preparation of the final EIS. Comments received during the public review period, along with responses, have been included in the final EIS. The final EIS has been submitted to agencies and the interested public for an additional 30-day review period, starting January 17, 2014. A Record of Decision will then be signed by the Assistant Secretary of the Army for Civil Works.

SUMMARY

Introduction

This Environmental Impact Statement (EIS) describes the potential beneficial and adverse environmental effects of alternative modifications to the Congressionally authorized Truckee Meadows Flood Control Project in the cities of Reno and Sparks in Washoe County, Nevada. Potential environmental effects of construction and long-term operation of the project are described in accordance with the National Environmental Policy Act (NEPA). The draft EIS was circulated for a 45-day public review period on May 24, 2013. All comments received during the review period were considered in the preparation of the final EIS. Comments received during the public review period, along with responses, have been included in the final EIS. The final EIS will be submitted to agencies and the interested public for an additional 30-day review period.

This EIS is a companion document to the General Reevaluation Report (GRR), which is also available for public and agency review. The final GRR and EIS will be submitted to the U.S. Army Corps of Engineers (USACE) Headquarters, the Assistant Secretary of the Army for Civil Works (ASA(CW)), and the Office of Management and Budget for review and approval. The Record of Decision will be signed by the ASA(CW). The Administration's recommendation will then be transmitted to Congress for potential project authorization and funding of the Federal share of the Recommended Plan.

Background

The Truckee Meadows Flood Control Project was authorized by the Water Resources Development Act (WRDA) of 1988 (Public Law 100-676), but was deferred in 1992 during the Pre-construction Engineering and Design (PED) phase when changes in real estate costs made the project economically infeasible. In 1996, local communities requested that flooding problems in Truckee Meadows be reevaluated. A major flood event in January 1997 exceeded all previous records and caused $450 million (unadjusted) in reported damages. USACE's planning process initially sought to identify a comprehensive solution for flood, ecosystem, and recreation problems, including detailed evaluation of a locally developed plan resulting from a community coalition process. Despite several iterative attempts, those efforts did not result in a plan that USACE could recommend. Therefore, in 2012 the study was re-scoped to focus plan formulation on flood risk management with basic recreation features. The primary purpose of the re-scoped reevaluation study is to assess the feasibility of modifying the Congressionally authorized project to reduce flood damages in the Truckee Meadows project area while avoiding or minimizing adverse effects.

1988 Authorized Plan

As shown in Figure 2-1,the authorized flood control features begin near Booth Street in downtown Reno, extend downstream along the Truckee River to the Truckee Meadows Wastewater Reclamation Facility (TMWRF), and continue up Steamboat Creek for approximately 2 miles. Features include floodwalls, setback levees, reconstruction/replacement of six bridges in downtown Reno, channel excavation, reconstruction of the TMWRF diversion dam, backwater levees on the North Truckee Drain, a large detention basin at the University of Nevada Agricultural Experiment Station (also known as UNR Farms), and levees along Steamboat Creek and Boynton Slough with an additional bridge modification. These project features were designed to provide "100-year flood protection" as defined in 1988. Authorized recreation features include a new pedestrian/bike bridge, bike lanes on bridges,

pedestrian/bike paths, and new access sites and improvements in downtown Reno. The authorized project includes riparian habitat plantings as compensatory fish and wildlife mitigation. Fish and wildlife "enhancement" features, consisting of riparian plantings, marsh habitat preservation, and fish habitat improvements, were also specifically authorized.

Purpose

The primary purpose of the reevaluation study is to assess the feasibility of modifying the Federally authorized project to reduce flood damages in the Truckee Meadows project area while avoiding or minimizing adverse effects. The study focus is on flood risk management with basic recreation features.

Project Location

The study area includes approximately 60 miles of the Truckee River beginning just upstream of Reno, passing through Sparks and the Truckee Meadows, and ending at the river's terminus, Pyramid Lake, on Pyramid Lake Paiute tribal lands (see Figure 1-1). The results of the reconnaissance study focused the general reevaluation study from the entire length of the Truckee River to the current study area. Because of the size of the land area and the number of river miles, the study area was divided into four general reaches: Verdi Reach, Downtown Reno Reach, Truckee Meadows Reach, and Lower Truckee River Reach (see Figure 3-1).

The Verdi Reach extends from the Fleish diversion dam to Booth Street in Reno's central business district. The Downtown Reno Reach extends from Booth Street downstream to Highway 395. The Truckee Meadows Reach encompasses an area bordered by Highway 395 on the west, Vista and the Virginia and Pah Rah Mountain Ranges to the east, south along Steamboat Creek to Huffaker Hills, and north to Sparks. The Lower Truckee River Reach extends from Vista downstream to the river's terminus at Pyramid Lake.

Need for Action

The need for the project is evidenced by the significant flooding experienced within the project area, the obstruction of fish passage for spawning fish species from Pyramid Lake as a result of numerous artificial barriers within the river, and the increased demand for recreational opportunities within the Reno-Sparks Metropolitan Area due to the significant increase in population experienced by the region.

Flood Risk Management

The Reno-Sparks-Truckee Meadows area has a long history of floods. Floods in the project area are caused by melting snow, cloudbursts, and heavy general rains. Rain floods, which normally occur during the period from November through April (characterized by high peak flows and short duration), have caused the major flood problems in the area. Early accounts indicate that flooding or periods of high water occurred during December 1861, January and February 1862, December 1867, January 1886, and May 1890. Since 1900, significant damaging rain floods occurred in 1907, 1909, 1928, 1937, 1950, 1955, 1963, 1986, 1997, and 2005.

Since about 1960, flood control works, consisting of reservoirs and channel modifications, have reduced the magnitude and frequency of flooding in the area. The 1950, 1955, 1986, 1997, and 2005 floods were similar in magnitude and were the most damaging because they occurred after residential and business areas of Reno began to spread to the south and southwest.

Fish Passage Improvement

The Truckee River once provided connectivity between the saline waters of Pyramid Lake and ultra-oligotrophic waters of Lake Tahoe, which once yielded Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) (LCT) greater than 30 pounds. As the cui-ui lake sucker (*Chasmistes cujus*)and LCT are both obligate freshwater spawners, they rely on sufficient inflow to allow them to run up the Truckee River to spawn; otherwise their eggs will not hatch.

Construction of more than 30 dams and water diversions over the 20th century has severely affected the movement of aquatic species throughout the Truckee River system. In particular, these structures act as complete or partial barriers to the upstream migration of the Federally threatened LCT and endangered cui-ui fish species to their historic spawning and rearing habitat. As a result, these native fish species are often forced to use sub-optimal habitats, reducing fish productivity and annual survivorship.

Three major structures impede fish movements between Pyramid Lake and Derby Diversion Dam: Marble Bluff Dam, 3 miles upstream; Numana Dam, 8.3 miles upstream; and Derby Diversion Dam itself, 34 miles upstream. There are also six small rock structures within the Pyramid Lake Reservation that impede passage. In addition, more than 14 other diversion structures upstream of Derby Dam impede passage to cooler reaches and spawning tributaries nearer the Sierra Nevada mountains. The most significant of these are Pioneer, Glendale, Washoe/Highlands, Verdi, Steamboat, and Fliesh diversion dams.

Fish passage improvement as an objective was considered during USACE's general reevaluation discussed in detail in the GRR. In 2012, the USACE and the Administration, in coordination with the non-Federal sponsor, decided to refocus plan selection on the primary project purpose of flood risk management to expedite completion of the study consistent with Administration and sponsor priorities. As a result, the action alternatives considered for recommendation are composed of flood risk management and recreation features in the Truckee Meadows area. As a companion document to the GRR, this EIS evaluates these same action alternatives so fish passage improvement is not discussed further in the EIS.

Recreation

Recreation opportunities have not kept pace with the increased demand stemming from a growing population in the Reno/Sparks area. The Truckee River is one of the most important water-oriented recreation resources in Washoe County and the only stream of its kind close to the Reno-Sparks market area. Local government agencies have long recognized the value of the river as part of their overall recreation planning. Recent recreation studies show both a current and future need for additional recreation facilities in the area.

Washoe County's Parks Inventory and Assessment, June 2007, indicates the growing demand for more recreation facilities in the region, including the project area. The County found that shifting patterns of residential growth, as well as average aging of the population over the next 20 years, would lead to demand for new recreation facilities and more passive recreation opportunities such as trails (Washoe County, 2007).

The City of Reno's Recreation Facilities Plan, 2008, discusses the condition of existing recreation facilities and identifies future recreation needs (over approximately 20 years) in order to maintain adequate levels of service for the projected population. According to the plan, the City will need to

provide additional parks, ball fields, community centers, fishing access, bicycle trails, open space, and other facilities and opportunities (City of Reno, 2008).

Both the information provided in the County's 2007 Parks Inventory and Assessment and the City's 2008 Recreation Facilities Plan indicate that existing recreation facilities and opportunities both in the region and city are inadequate.

In addition, an insufficient number of outdoor recreation opportunities are located close to the population centers, where many lower-income and least formally educated citizens live. The 2010 Nevada Statewide Outdoor Recreation Plan indicates that lower income and less educated residents participate in outdoor recreation at lower rates than other groups. The America's Great Outdoors Initiative encourages recreation facilities to be located near populated areas to help serve these communities.

U.S. Army Corps of Engineers Authorities

The Truckee Meadows Flood Control Project[1] was authorized by WRDA 1988, § 3(a)(10), which reads:

> Truckee Meadows, Nevada.--The project for flood control, Truckee Meadows, Nevada: Report of the Chief of Engineers, dated July 25, 1986, at a total cost of $78,400,000, with an estimated first Federal cost of $39,200,000 and an estimated first non-Federal cost of $39,200,000; except that the Secretary is authorized to carry out fish and wildlife enhancement as a purpose of such project, including fish and wildlife enhancement measures described in the District Engineer's Report, dated July 1985, at an additional total cost of $4,140,000.

After a general reevaluation of the authorized project was initiated, the 1990 Tribes Water Rights Settlement Act, § 207, provided direction regarding the conduct of the study as follows:

> The Secretary of the Army, in consultation with and with the assistance of the Pyramid Lake Tribe, State of Nevada, Environmental Protection Agency, the Secretary [of Interior], and other interested parties, is authorized and directed to incorporate into its ongoing reconnaissance level study of the Truckee River, a study of the rehabilitation of the lower Truckee River to and including the river terminus delta at Pyramid Lake, for the benefit of the Pyramid Lake fishery. Such study shall analyze, among other relevant factors, the feasibility of:
>
> - Restoring riparian habitat and vegetative cover
> - Stabilizing the course of the Truckee River to minimize erosion
> - Improving spawning and migratory habitat for the cui-ui
> - Improving spawning and migratory habitat for the Lahontan cutthroat trout
> - Improving or replacing existing facilities, or creating new facilities, to enable the efficient passage of cui-ui and Lahontan cutthroat trout through or around the delta at the mouth of the Truckee River, and to upstream reaches above Derby Dam, to obtain access to upstream spawning habitat.

The Secretary of the Army received additional guidance regarding USACE's conduct of the GRR pursuant to the House Report associated with EWDAA 1996, providing:

[1] A previous USACE project was authorized and constructed pursuant to the FCA 1954, § 203, and the FCA 1962, § 203.

> The Secretary of the Army is directed to initiate a general reevaluation report for the Truckee Meadows Flood Control project, Nevada, authorized in the Water Resources Development Act of 1988. Of the $400,000 provided in the conference agreement for the lower Truckee River, Nevada, project, $50,000 is appropriated for this investigation. The report will consider additional flood protection at and below Reno, Nevada, through levee/channel improvements, local impoundments, and potential reoperation of existing reservoirs in the watershed. The report will also consider the potential for environmental restoration along the Truckee River and tributaries in the Reno-Sparks area.

During the current general reevaluation, EWDAA 2006, § 113, was passed, which states:

> Truckee Meadows Flood Control Project, Nevada: The non-Federal funds expended for purchase of lands, easements and rights-of-way, implementation of project monitoring and assessment, and construction and implementation of recreation, ecosystem restoration, and water quality improvement features, including the provision of 6,700 acre-feet of water rights no later than the effective date of the Truckee River Operating Agreement for revegetation, reestablishment and maintenance of riverine and riparian habitat of the lower Truckee River and Pyramid Lake, whether expended prior to or after the signing of the Project Cooperation Agreement (PCA), shall be fully credited to the non-Federal sponsor's share of costs for the project: Provided, that for the purposes of benefit-cost ratio calculations in the General Reevaluation Report (GRR), the Truckee Meadows Nevada Flood Control Project shall be defined as a single unit and non-separable.

Project Objectives

The planning objectives for flood risk management and recreation are listed below.

Flood Risk Management Objectives

- Reduce flood damages in the Downtown Reno and Truckee Meadows reaches along the Truckee River and tributaries from overbank flows to the fullest extent consistent with Federal participation and community financial capabilities.
- Reduce the potential for loss of life from flooding from the Truckee River.

Recreation Objectives

- Increase recreational opportunities along the Truckee River between Highway 395 and Vista.

Alternative Formulation Process

During the general reevaluation, the Federal water resources planning process was used to identify a recommended plan. Following definition of problems and opportunities related to flooding, ecosystems, and recreation, specific planning objectives and constraints were identified. Next, various structural and non-structural management measures were identified to achieve the planning objectives and avoid the planning constraints. Management measures were screened based on how well they met the study objectives and formulation criteria, and some measures were dropped from further consideration at that point. The retained management measures were combined to form preliminary alternative plans.

Flood Risk Management

For the Downtown Reno reach, seven preliminary flood risk management alternatives, including

a non-structural alternative, were evaluated. The structural alternatives focused on the modification of multiple bridges, along with increases in channel capacity, levees, and floodwalls. None of the preliminary alternatives were found to be economically justified, so no plan was carried forward for detailed evaluation.

For the Truckee Meadows reach, three preliminary alternatives representing different strategies were initially evaluated. All three alternatives included levees and floodwalls along portions of the Truckee River between Highway 395 and Vista. Alternative 1 was limited to levees and floodwalls as the primary features. Alternative 2 also included detention facilities at Huffaker Hills, UNR Farms and Mustang Ranch. Alternative 3 included floodplain terracing in addition to levees and floodwalls. In response to stakeholder input, eight additional preliminary alternatives focused on increasing storage opportunities at Huffaker Hills, UNR Farms, and Upper Lockwood were also evaluated. The preliminary alternatives were developed to a level of detail to allow a basic comparison of costs and benefits. None of the eight additional storage alternatives were found to be economically justified. Of the three initial alternatives, Alternative 3 was ranked the highest, but had not yet been identified as the National Economic Development (NED) plan for flood risk management. Alternative 3 was the focus of a reformulation workshop with the Truckee River Flood Management Authority (TRFMA), the non-Federal sponsor of the project, and USACE vertical team members held in November 2011 to identify a Federally supportable flood risk management plan. The reformulation workshop assessed the incremental costs and benefits of the various elements of Alternative 3 to ensure that each added element was incrementally justified. The workshop focused on the 2 percent (%) Annual Exceedence Probability (AEP) scale of Alternative 3 (the 2% event is also commonly called the 1:50, 1/50, or "50-year" event) as the previously evaluated scale with the greatest net economic benefits. Terracing downstream of Steamboat Creek was eliminated from Alternative 3, and capping of People's Drain outlets was added, as a result of the workshop.

Federal policy requires USACE to recommend the plan that reasonably maximizes net economic benefits consistent with protecting the Nation's environment (the NED Plan), unless an exception is granted by the ASA(CW). The 2% AEP scale of the reformulated Alternative 3 was identified as the plan that reasonably maximized net economic benefits consistent with protecting the environment.

Recreation

Three alternative recreation plans composed of policy-compliant basic recreation features were formulated based on the opportunities provided by the flood risk management NED Plan. All three recreation plans included picnic areas, fishing access, non-motorized watercraft launches, and trails. The two larger scale plans also included a playground and group picnic shelters. The largest scale plan (Recreation Alternative C) is economically justified and would provide the maximum net recreation benefits and was therefore included in the NED Plan.

Locally Developed Plan

In 2008, TRFMA requested that USACE include a fourth alternative for consideration that was more closely aligned with the Community Coalition's "living river" concept and met their local objective of flood risk reduction at the 1% chance event in the Downtown Reno reach and the 0.89% chance event (equivalent to flows experienced in the 1997 flood event) in the Truckee Meadows reach. As a result, USACE included Alternative 4–Locally Developed Plan, a variation of Alternative 3d, among the alternatives for consideration. In the Downtown Reno reach, the locally developed plan proposed the replacement or removal of five downtown bridges, presenting the greatest obstructions to flow. In addition, the plan included construction of floodwalls and levees; flood-proofing; bed, bank, and pier scour protection; interior drainage management features; and temporary closures structures from just

upstream of Booth Street to Highway 395. In general, in the Truckee Meadows reach, the locally developed plan flood risk management features were the same as Alternative 3-Floodplain Terrace Plan, but sized to contain flood flows of a 0.89% ACE. In addition, the plan included lengthening the McCarran Boulevard and Rock Boulevard bridges, a bypass channel around the Sagewinds/ Bristlecone property, floodproofing at the Hidden Valley and East Side subdivisions, a ring levee around the UNR Farms Main Experiment Station, and realignment of the North Truckee Drain. As a result of this alternative, significant increases in downstream flows (approximately 3,300 cfs at the 1% chance event) would have required hydraulic mitigation in the form of bed, bank, and pier scour protection, floodwalls at Lockwood/Rainbow Bend, replacement of Painted Rock Bridge, floodwalls at Wadsworth, and additional bank terracing downstream of Lockwood Bridge.

Alternatives not Considered Further

NEPA requires that an EIS consider a range of reasonable alternatives that could accomplish the project's purpose and need, as well as a no action alternative for comparison. Reasonable alternatives are those that may be feasibly carried out based on technical, environmental, economic, and other factors such as local support and legal adequacy. Alternatives determined to be infeasible do not need to be considered in an EIS, but the reasons why they were not considered need to be explained in the EIS. For the Truckee Meadows Flood Control Project EIS, the Levees and Floodwalls Plan and the Locally Developed Plan were considered to be infeasible as discussed below.

Alternative 1-Levees and Floodwalls Plan

As designed, the Levees and Floodwalls Plan included construction of approximately 10-foot-high earthen levees and concrete or cinder block floodwalls on the banks immediately adjacent to the Truckee River, as well as along tributary streams and canals, in the Truckee Meadows reach. Riparian and aquatic resources are of extremely high value in this arid state, and construction would involve permanent removal of 21 acres of riparian habitat and significant adverse effects on aquatic habitat. Construction would also permanently change the regionally important Truckee River viewshed from pleasing riparian/riverine views to abrupt high levees or floodwalls. Both environmental groups and residents in the Reno area expressed substantial opposition to this alternative during public and agency meetings and workshops. In addition, the likely cost-sharing partner indicated an unwillingness to participate in this alternative because of the higher costs of this alternative (greater than one and one half times the cost) as compared to the Floodplain Terrace Plan . Because of the significant environmental effects, substantial public opposition, and lack of partner support, the Levees and Floodwalls Plan was considered to be infeasible and was not considered further in the EIS.

Locally Developed Plan

Although the locally developed plan would have provided a greater level of flood risk reduction in the Truckee Meadows reach, as well as provided a greater reduction in flood risk in the Downtown Reno reach, the cost of this plan was more than four times the cost of the Floodplain Terrace Plan, and the economic benefits from flooding it would prevent did not present a substantial incremental increase for that cost. In order for USACE to recommend a plan for implementation, the plan must demonstrate an economic benefit at least equal to its cost. In the case of the locally developed plan, the costs far exceeded the benefits provided, conservatively estimated at less than 0.8 to 1 return on total investment. In addition, the locally developed plan would have induced the highest increase in downstream flows of all alternatives considered, requiring the greatest amount of hydraulic mitigation to address effects these increased flows would have on scour potential and flooding in the Lower Truckee River reach. Implementation of the larger hydraulic mitigation footprint would also lead to greater effects to riparian and aquatic habitat, as well as fisheries resources, including those of the threatened LCT and endangered

cui-ui. Because of the substantial cost, significant environmental effects, and greater flooding effects to downstream communities, this alternative was not considered further in the EIS.

In an effort to identify a plan that would meet their "100-year level of flood protection" objective and demonstrate an increase in net economic benefits, TRFMA is pursuing revisions to their locally developed plan. A review of their proposed revisions indicates that they are considering similar features to the Recommended Plan, employing levees, channels, floodwalls, and floodplain terracing to convey flows. TRFMA's revised locally developed plan appears very similar to Alternative 3c, discussed in section 3.4. Like Alternative 3c, TRFMA's revised plan includes increasing conveyance capacity through the Vista Narrows. The main differences between TRFMA's revised plan and Alternative 3c are the realignment of the North Truckee Drain and mitigation proposed for downstream hydraulic impacts. According to TRFMA's hydraulic modeling outputs, their revised plan would increase peak downstream flows to 3,600 cfs for the "100-year" design flood event. Because of this, their revised plan includes elevating 37 to 47 structures in Rainbow Bend and the Wadsworth vicinity, as well as acquiring flowage easements in the Lower Truckee River reach, as mitigation measures. TRFMA's revised plan does not include downstream bank stabilization as part of the initial construction, as anticipated by USACE for mitigation from a similar increase in peak flows, but does include acquiring access easements for potential future scour remediation. The revised plan also includes 0.8 acre of terracing on the west bank of Steamboat Creek to remove a flow constriction. The North Truckee Drain realignment is similar to the realignment considered as part of Alternative 2 in this EIS.

Based on USACE's review, TRFMA's revised locally developed plan is not a substantially different alternative than those already considered in this EIS. In general, TRFMA's revised plan is a larger scale plan than the Recommended Plan, but is within the range of project scales considered by USACE as part of its economic and environmental evaluations. The main differences between the TRFMA plan and USACE alternatives involve design details, ancillary features (e.g., North Truckee Drain and Steamboat Creek bank terrace), and mitigation measures for hydraulic and habitat impacts, rather than the primary features considered to address the project purpose and need.

Alternatives Considered in Detail

Based on the results of the economic analysis, flood risk management and recreation plans identified were combined to form the final array of alternatives to be considered further, as follows:

- No Action (Future Without-Project) Alternative
- Alternative 3-Floodplain Terrace Plan
- Atlernative 2-Detention Plan

As indicated in Appendix G of the USACE Planning Guidance Notebook (ER 1105-2-100), a comparison of the recommended plan to the authorized plan is called for when changes to a Congressionally authorized plan are being proposed. This includes an evaluation of environmental effects. Given the time that has elapsed since completion of the authorized plan's EIS (1985) and changes that have occurred in the project area since 1985, a detailed analysis of Alternative 2-Detention Plan, which is similar to the authorized plan, is included in this EIS to establish relevant environmental effects for comparison to the recommended plan. A No Action Alternative is also included as required by NEPA for comparative purposes.

National Economic Development Plan (Floodplain Terrace Plan)

The National Economic Development (NED) plan is Alternative 3-Floodplain Terrace Plan (also

identified as Alternative 3 in this EIS). The Floodplain Terrace Plan efficiently reduces flood damages in high-value commercial and industrial areas near the Truckee River, including the Reno-Tahoe International Airport, by containing flood flows with levees and floodwalls, enlarging the existing channel with floodplain terracing, and by detaining peak flows in a designated overflow area. The designated overflow area is on the south side of the river near the mouth of Steamboat Creek and is largely occupied by the University of Nevada Agricultural Experiment Station (also known as UNR Farms). The NED Plan provides 90% assurance of safely passing the 2% ACE in major damage areas and includes basic recreation features that are compliant with USACE policy.

Major Environmental Effects

A comparison of environmental effects by alternative is provided in Table S-1. An evaluation of environmental effects determined that the NED Plan has the potential for adverse effects on a number of environmental resources.

Construction of the flood risk management features of the NED Plan would detrimentally affect fish and wildlife habitat. The NED Plan would cause temporary and permanent losses of riparian habitat from construction activities required for excavations, floodwalls, and levees, affecting 28.3 acres of native riparian habitat.

Removal of riparian habitat that shades the river would also potentially increase water temperatures, which would be detrimental to fish spawning activities and egg and young survival. The NED Plan would remove about 7,200 linear feet of riparian river shading. However, the plan would avoid long-term effects to water temperature through revegetation of floodplain terraces and implementation of bioengineering techniques in scour protection features.

The NED Plan would remove approximately 1.1 acres of existing wetland habitat primarily associated with Pioneer Ditch and the North Truckee Drain. However, the NED Plan would reestablish connection of the river to its historic floodplain through excavation and revegetation of floodplain terraces that are exposed to seasonal inundation.

In-channel construction activities would represent a temporary disturbance to fisheries habitat. Construction of in-channel floodwalls and scour protection features for the NED Plan would involve temporary disturbance of 3.7 acres of river bottom and the permanent loss of approximately 2.5 acres of open water habitat along the river margin and the North Truckee Drain. However, following completion of construction activities, river bottom habitat conditions are expected to be similar to existing conditions. Bottom dwelling organisms are expected to repopulate to pre-project levels within 6 months.

In-channel construction would also temporarily increase turbidity levels, causing spawning gravel spaces to fill in, which contributes to low dissolved oxygen levels and causing gill damage. Increases in turbidity levels during construction would be avoided or minimized by use of cofferdams to divert flows around the construction area, timing construction during low flows, installing silt screens, and monitoring turbidity levels to avoid exceeding significance thresholds.

Increased turbidity levels and water temperatures also represent a potential adverse effect to the Federally listed threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) (LCT) and endangered cui-ui lake sucker (*Chasmistes cujus*). The current population of LCT[2] is being sustained by a stocking program carried out by USFWS, Pyramid Lake Paiute Tribe, and NDOW because existing water temperature conditions do not support survival of juveniles in and downstream of the project area.

[2] The Lahontan cutthroat trout was extirpated from the Truckee River in the early 20th century.

Long-term increases in water temperature as a result of the project could hinder recovery of a self-sustaining LCT population in the Truckee River. Cui-ui populations are only present below Derby Dam downstream of the project area. While changes in water temperature and turbidity could represent an indirect adverse effect to cui-ui, measures to control turbidity levels during construction would be implemented.

Reestablishment of riparian vegetation on floodplain terraces and within scour protection features would avoid or minimize adverse long-term temperature-related effects to these species. The limited increase in downstream flows induced by the NED Plan are not expected to generate a measurable change in sediment aggradation or degradation within the Lower Truckee River.

The NED Plan would convert about 30 acres of prime and unique farmland and 19 acres of farmland with statewide and local importance would be converted for levee construction. While the overall acreage of land available for agriculture would be reduced in portions of the Truckee Meadows reach, the conversion of land for flood risk management would reduce the danger of catastrophic floods and benefit the remaining agricultural land by improving groundwater recharge and nutrient exchange through construction of the floodplain terraces.

In all cases the potential adverse environmental effects would be reduced to a less-than-significant level through project design, construction practices, preconstruction surveys and analysis, regulatory requirements, and best management practices. No compensatory mitigation would be required. A National Pollutant Discharge Elimination System (NPDES) general construction permit would be required. A Storm Water Pollution Prevention Plan (SWPPP) and Spill Prevention Control and Countermeasures Plan (SPCCP) would be developed by the contractor prior to construction.

Areas of Controversy

Increased Depth of Flooding from NED Plan

Feasibility-level hydraulic modeling of the NED Plan found that the 1% ACE flood elevations (also commonly referred to as 1/100, 1:100, or 100-year flood) increase between 0.0 and 0.6 foot in several areas near the downstream end of the project as compared to the without-project condition. (There is some level of uncertainty in any hydraulic model. In this case the actual without- and with-project water surface elevations could be 0.5 foot lower or higher than estimated.)

- UNR Farms and southern periphery: The flood elevation increase in the UNR Farms area is up to 0.6 foot. The USACE-estimated with-project 1% ACE flood elevations would exceed the first floor elevations of an estimated 900 existing structures (mostly single-family residences and multiplex apartment buildings) on the southern periphery of the UNR Farms area that are also within the USACE without-project 1% ACE floodplain. An estimated additional 175 residences that are outside of the USACE without-project 1% ACE floodplain would be within the limits of the with-project floodplain, but it is estimated that their first floors would still be above the with-project flood elevation. However, the estimated increase in the 2% ACE flood elevations would affect about 22 existing structures south of UNR Farms, most of which would have an estimated increase of 0.2 to 0.4 foot.
- North Truckee Drain (NTD): The 1% ACE flood elevation on both sides of the NTD immediately north of I-80 would be increased by approximately 0.5 to 1 foot due to backwater effects in the NTD.

Figure 3-2 shows the areas in the estimated without- and with-project 1% ACE floodplains.

USACE policy allows mitigation for induced flooding to be recommended as a project feature when it is economically justified or there are overriding reasons of safety, economic, or social concerns, or a determination of a real estate taking has been made (ER 1105-2-100, para.3-3.b.(5)). Potential mitigation measures for induced flooding were considered by the District, but none were found to be economically justified. The structural and non-structural measures considered for the south side of the Truckee River were: raising or wet flood-proofing existing residential and commercial structures; levees and floodwalls to protect existing structures; a detention basin with perimeter levees in the UNR Farms area; excavation of the hydraulic constriction downstream of Truckee Meadows including downstream hydraulic and environmental mitigation; or purchase/removal of the affected structures. The structural and non-structural measures considered for the north side of the Truckee River were a pump station, ring levees, or raising/wet flood-proofing existing residential and commercial structures. Raising/flood-proofing structures on the south side and a pump station on the north side were found to be the least costly options that could be added to the NED Plan, based on rough cost estimates for each measure by District civil design and cost engineering staff using their professional experience. The average annual flood risk management benefits for those measures were found to be far less than required to justify their costs. Any increase in flooding will be an important concern for adversely affected property owners. However, because of the small increase in flood elevations and the low recurrence frequency of induced flooding, those concerns are not considered to be overriding safety, economic, or social concerns under USACE policy, no real estate taking would occur within the areas of induced flooding in the Truckee Meadows reach. Therefore, mitigation for induced flooding is not proposed as a project feature of the Federally funded NED Plan.

The economic costs for the NED Plan include the estimated minimum cost for non-Federal interests to comply with the National Flood Insurance Program (NFIP) (42 U.S.C. § 4001, et seq.). The NFIP compliance costs are not based on specific features proposed by TRFMA. The estimated NFIP compliance costs are based on the least-cost features that could be added to the NED Plan by local interests, without modifying the NED Plan, to achieve NFIP compliance.

USACE has considered several options for NFIP compliance and determined that non-structural methods including house raising would likely be the least-cost option on the south side of the Truckee River. Based on feasibility-level hydraulic modeling, approximately 764 homes and 128 multiplex apartment buildings would need to be raised in the area south of the river. An additional four commercial structures and three public buildings would also need to be raised or "wet flood-proofed" with closures and sealing. For the north side of the Truckee River, a 400-cfs capacity pump station on the North Truckee Drain with an outfall to the Truckee River would be the least-cost option.

Because compliance with the NFIP is a non-Federal responsibility, the affected NFIP communities could develop their own plan for compliance with the NFIP and would not be required to implement the specific assumed least-cost features. The estimated NFIP compliance costs are subject to change based on more detailed hydraulic analysis during final design of the project, including the results of NFIP hydraulic modeling assumptions and methods, and more detailed surveys of the elevations of existing structures. The induced flooding generated by the Recommended Plan would be considered a significant adverse affect if the non-Federal sponsor does not implement hydraulic mitigation to comply with NFIP requirements.

Effects on Threatened and Endangered Fish Species

Work in the river channel to construct in-channel floodwalls and scour protection features could result in direct injury and/or mortality to the threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) and disturbance to fisheries habitat. Excavation and fill could increase fine sediment input.

Fish and aquatic invertebrate assemblages could be indirectly affected by increased erosion, sedimentation, and water turbidity during construction within the channel. Excessive sediment quantities deposited in stream channels can degrade aquatic habitat. Increased turbidity could result in increased fish mortality, reduced feeding opportunities, and could cause fish to avoid biologically important habitat.

To reduce these construction-related effects to a less-than-significant level, erosion control and spill prevention plans would be developed and BMPs implemented, as discussed in Section 5.4 Water Quality.

Construction of flood risk management features in the Truckee Meadows reach would result in loss of near-shore woody vegetation and other riparian vegetation. Riparian vegetation generally includes the woody vegetation and cover structures associated with stream banks that function to provide shade; sediment, nutrient, and chemical regulation; stream bank stability; and input of woody debris and leaves that provide cover and serve as substrates for food-producing invertebrates. Most of the riparian habitat function within the construction footprint of in-channel floodwalls and scour protection features is provided by relatively young, narrow willow stands adjacent to the channel and a small number of mature cottonwood stands. Loss of this vegetation would have a direct effect on water temperature conditions in the Truckee Meadows reach, and to a lesser degree, indirectly affect water temperature conditions in the Lower Truckee River reach. Any increase in water temperature resulting from loss of riparian vegetation is considered a significant effect due to potential adverse effects on trout populations and juvenile fish.

While the increase in water temperature from construction-related activities could represent a significant short-term effect to fisheries, it is important to note that native fish species such as the Lahontan cutthroat trout and cui-ui have adapted to highly variable temperature regimes that are typical for their native habitat range. Lahontan cutthroat trout are noted for their ability to live in Nevada streams and can survive in water where temperatures exceed 27 degrees Celsius for short periods and prolonged exposure to 25 degree Celsius temperatures. In addition, most native fish move in rivers as flows and prey availability changes, and will likely move to more preferable areas in response to local conditions. Trout in general move to cooler pools and deeper waters during daylights hours when temperatures can increase to threshold levels.

Regarding temperature changes in the river potentially resulting from reduced shading caused by vegetation removal, the magnitude of effect from project activities is unclear. Current shading provided by the existing vegetation occurs only along the marginal areas of the river for limited periods during the day. The relative shaded area compared to the overall "wetted" area of the river is small and may not significantly affect the overall water temperatures of the river. However, there may be small localized pools that may benefit from the shoreline shading, resulting in some change of habitat quality. During PED phase, further analysis of existing conditions can identify any specific areas of particular concern. Project implementation may be adapted to avoid these particular areas. In order to avoid or minimize short-term effects to water temperature resulting from temporary loss of riparian shading, the following measures would be implemented:

- Project construction would be phased over a 5-year period to allow for transitional effects to the overall project area, so that only a portion of the riparian shading would be lost per year. During each successive year, riparian plantings would mature over the course of the project.
- Planting some mature trees in critical areas would be considered to attain short-term benefits while younger riparian vegetation matures.
- Water temperatures would be monitored during the first year of construction and adapt short-term mitigation efforts for successive years based on changes measured.

Long-term adverse effects would be associated with all levee and floodwall features throughout the Truckee Meadows reach. While revegetation of disturbed sites would be implemented immediately following construction, it would take several years for the riparian vegetation to reestablish itself within the current riparian zone. Slight increases in water temperature may occur until full reestablishment of near shore woody vegetation is reached. However, proposed revegetation of the floodplain terraces following construction and implementation of bioengineering techniques within scour protection features would represent a net increase in riparian habitat and near-shore woody vegetation. Therefore, long-term effects to water temperature would not be considered significant. A biological opinion (BO) and incidental take statement for project-related effects on Lahontan cutthroat trout and cui-ui was issued by USFWS on December 4, 2013. The project would implement all reasonable and prudent measures and the terms and conditions identified in the BO to comply with Endangered Species Act requirements.

Issues to be Resolved

The following issues are still being resolved:

- The non-Federal cost-sharing partner would be responsible for identifying and carrying out their own plan for NFIP compliance, which may or may not be the same as the specific least-cost features assumed for the economic costs in the NED Plan.

Public Involvement

The public and concerned resource agencies have been invited to participate in all phases of the Truckee Meadows Flood Control Project since the initiation of the General Reevaluation Study in 1996. This has included opportunities to comment on the 1997 Reconnaissance Report; Notice of Intent; public scoping meeting conducted in 1999; and public workshops in 2000, 2003, 2005, and 2013. Additional efforts included disseminating information through a project web site and publishing a monthly newsletter. Public involvement encouraged the consideration of setback levees and floodplain terracing as flood risk management measures that would minimize the physical isolation of the river from the surrounding community. Public involvement also influenced the types of recreation features included in the Recommended Plan.

Recommended Plan

The Recommended Plan is the NED Plan for flood risk management (Alternative 3 – Floodplain Terrace) and recreation (Alternative C). Incidental flood risk management benefits resulting from NFIP compliance have been included in the economic analysis of the Recommended Plan. The Recommended Plan includes:

- 9,650 linear feet of on-bank (6,500 feet) and in-channel (3,150 feet) floodwalls, and 31,000 linear feet of levees along the north and south banks of the Truckee River. This would also include a gravel levee maintenance road/recreational trail.
- 1.7 miles of new floodplain terraces along south bank of Truckee River from Greg Street to East McCarran Boulevard.
- 3,100 feet of North Truckee Drain in twin 11.5-foot by 10-foot concrete box culverts south of I-80, including a 200-foot extension to Peoples' Drain.
- Caps on two junction structures of Peoples' Drain.
- Under-seepage remediation with seepage berms, drainage blankets, impervious berms, and relief

wells.

- Interior drainage management with 14-cfs pumping station upstream of Glendale Boulevard and new flap or vertical sluice gates at all existing storm drains.
- 1,700 linear feet of bioengineered bank scour protection and 9,900 linear feet of rock riprap bank scour protection.
- Bridge abutment and pier scour protection at three bridges.
- 60 acres of riparian vegetation planting along 1.7 miles of new floodplain terraces on the south bank of Truckee River from Greg Street to East McCarran Boulevard.
- 14,100 feet of existing recreational trails along segments of the current trail alignment to be relocated outside of levee/floodwall footprint.
- Four canoe/kayak launch points at Fisherman's Park, Glendale Park, Cottonwood Park, and the trail access at the end of Sparks Boulevard.
- 50 new picnic tables on the north and south sides of the river, including 36 within the recreation focus area of the proposed plan between Rock Boulevard and McCarran Boulevard.
- 13 fishing access locations on the north and south sides of the river, from Highway 395 to Cottonwood Park.
- 18,600 linear feet of new paved (9,700 feet) and unpaved (8,900 feet) recreation trail.
- Community park at the current location of the Excel Building on Mill Street, which would include a parking lot, playground, public restroom, medium-sized picnic shelter, and access to new recreation trails.
- Small-sized picnic shelter at the current Sagewinds property.

Table S-1 **Comparison of Effects by Alternative** ***Issue***			
Significance Criteria	**No-Action Alternative**	**Recommended Plan** **Alternative 3-Floodplain Terrace Plan**	**Alternative 2-Detention Plan**
Hydrology and Geomorphology			
Effects to Existing Hydrology			
Induced Flooding Offsite	Current annual exceedence probability by reach: Downtown Reno - 1:45 AEP Truckee Meadows – 1:20 to 1:35 AEP Lower Truckee River – 1:15 AEP	Decreases flood risk behind project features to at least the 1:50 AEP. Increases flood elevation at UNR Farms and southern periphery by up to 0.6 foot in the 1:100 AEP event. This exceeds first floor elevations of estimated 900 existing structures south of UNR Farms. Additional 175 residences would be within the 1/100 ACE floodplain but first floor elevations would be above flood elevations. Backwater effects on the NTD would increase the 1/100 ACE flood elevation approximately 0.5 to 1 foot north of I-80. **Less than significant with non-Federal partner implementation of hydraulic mitigation for compliance with NFIP.**	Decreases flood risk behind project features to at least the 1:100 AEP. Increases flood elevation at UNR Farms but within the detention basin. NTD realignment reduces backwater effects upstream of I-80. **Beneficial.**
Effects to Existing Geomorphology			
Channel Stability and Sediment Transport.	Natural geomorphic processes typical of sediment-limited systems would continue under this alternative, as the river seeks an equilibrium condition. These processes may be occurring at a slower pace (relative to long term historical trends) due to the existing streambed armoring and grade control structures (dams, bridges, weirs, rock formations). Scour protection for channel bed and banks, as well as bridge piers and abutments, would continue to be replaced by others at existing locations, and protection would be placed in areas of new scour to protect existing infrastructure.	In-channel floodwalls and scour protection features would reduce effects on lateral channel migration and incision at key infrastructure within the Truckee Meadows. **Less than significant.** No change to effective discharge in the Lower Truckee River reach indicates less than significant effect on channel evolution and sediment dynamics. **Less than significant.**	Same as Alternative 3.

Table S-1 Comparison of Effects by Alternative ***Issue***			
Significance Criteria	**No-Action Alternative**	**Recommended Plan Alternative 3-Floodplain Terrace Plan**	**Alternative 2-Detention Plan**
Water Quality ***Effects to Water Quality***			
Violation of Criteria Identified in the NAC or PLPT WQCP	Overall improvement of water quality with implementation of TROA, ecosystem restoration projects by others, and increased regulation of water quality standards by State and local agencies.	Avoid exceedence of water quality standards, including total suspended solids, by implementation of BMPs and monitoring during construction. Short-term increase in water temperatures from removal of riparian shading. Water temperature effects reduced to less than significant long-term with environmentally sustainable design features such as native riparian vegetation on floodplain terraces and bioengineered scour protection. **Less than significant with BMPs and environmentally sustainable designs.**	Greater construction related effects to water quality conditions than Alternative 3 due to greater ground disturbing activities in and along the Truckee River, Steamboat Creek, and Boynton Slough. Greater potential for increasing water temperature due to removal of more riparian shading than Alternative 3. Implementation of BMPs and riparian habitat mitigation in the Truckee Meadows would reduce the short term and long term effects to less than significant. **Less than significant with BMPs and riparian habitat mitigation.**
Induce Substantial Erosion or Sedimentation On- or Off-site	North side of river in project area highly developed with low erosion potential and low sediment source except along incised channel banks. South side of river in project area open space and agricultural with higher erosion potential and sediment input.	Short-term increase in erosion and sedimentation to be avoided by implementation of BMPs. Long-term effects on erosion and sedimentation rates less than significant with revegetation of disturbed areas and environmentally sustainable designs. **Less than significant with BMPs and environmentally sustainable designs.**	Same as Alternative 3.
Vegetation and Wildlife ***Effects to Vegetation and Wildlife***			
Substantial Loss of Native Vegetation or Important Wildlife Habitat Quantity or Quality	Reestablishment of floodplains and associated riparian habitat expected to progress at a slower pace in the future and would only be within the degraded or enlarged channel (smaller than historic floodplains). Restoration efforts from TNC and others would accelerate the channel evolution, dependent upon funding and land availability. Implementation of TROA is expected to enhance riparian habitat and riparian-associated wildlife species because of the increased availability of environmental flows when compared to pre-TROA conditions.	Project features would result in a loss of 1.1 acres of emergent wetland/marsh habitat and a net increase of 12.4 acres Native Riparian Forest and 49.9 acres of Willow/Mixed Willow Scrub habitat following implementation of environmentally sustainable design features such as revegetation of floodplain terraces and bioengineered scour protection. **Less than significant with BMPs and environmentally sustainable designs.**	Loss of Emergent Wetland/Marsh (4.9 acres), Upland Native Herbaceous/Shrub/ Grasslands (5.7 acres), Native Riparian Forest (6.3 acres), Willow/Mixed Willow Scrub (16.9 acres), and Open Water/Pond/Riverine (5.4 acres) habitat cover types. Habitat mitigation would be established as follows: Emergent Wetland/Marsh (9.8 acres), Upland Native Herbaceous/Shrub/ Grasslands (5.7 acres), Native Riparian Forest (12.6 acres), Willow/Mixed Willow Scrub (33.2 acres), and Open Water/Pond/Riverine (18.2 acres). **Less than significant with habitat mitigation.**

Table S-1 Comparison of Effects by Alternative ***Issue***			
Significance Criteria	**No-Action Alternative**	**Recommended Plan Alternative 3-Floodplain Terrace Plan**	**Alternative 2-Detention Plan**
Effects to Jurisdictional Wetlands or Waters of the United States	Jurisdictional wetlands and other waters of the United States in the project area are associated with irrigation ditches, such as Pioneer Ditch, the NTD, Steamboat Creek, Boynton Slough, and the Truckee River. There are also farmed wetlands on the south side of the river.	Construction of project features, particularly scour protection and in-channel floodwalls, would represent placement of fill in or disturbance to approximately 28.6 acres of waters of the United States, primarily the Truckee River and Pioneer Ditch. Excavation of floodplain terraces would remove wetlands associated with the Pioneer Ditch irrigation system. The lower floodplain terrace would be excavated to an elevation that would seasonally inundate 40 acres of willow/mixed willow scrub habitat. **Less than significant with environmentally sustainable designs.**	Loss of 39.8 acres of wetlands and waters of the United States. Mitigation for loss of weltands and waters of the U.S. at a ratio of 2:1 is incorporated into the habitat mitigation proposed above. **Less than significant with habitat mitigation.**
Fisheries			
Effects on Fisheries Resources			
Substantial Effects to Important Commercial or Game Fish Species and Fisheries Habitat	With implementation of TROA, environmental flows are expected to generally increase compared to pre-TROA conditions, providing a long-term benefit to fisheries in the Truckee River and Pyramid Lake.	Short-term effects to fisheries could result from water quality effects such as increased turbidity and water temperatures during construction. Long-term effects related to water temperature increases from removal of riparian shading could occur until replanted riparian vegetation establishes. **Less than significant with BMPs and environmentally sustainable designs.**	Greater effect than Alternative 3 due to greater water quality effects from construction and more loss of riparian habitat, including riparian shading. Effects reduced to less than significant with BMPs and habitat mitigation. **Less than significant with BMPs and habitat mitigation.**
Special Status Species			
Effects on Special Status Species			
Direct Mortality, Temporary Effects to Habitat, Permanent Loss of Critical Habitat	With implementation of TROA, environmental flows are expected to generally increase as compared to pre-TROA conditions, providing a long-term benefit to fisheries in the Truckee River and Pyramid Lake. USFWS would continue to pursue their recovery plans for the threatened Lahontan cutthroat trout and endangered cui-ui fish.	In-channel construction could directly affect Lahontan cutthroat trout individuals and have temporary effects to their habitat, including short-term increases in turbidity levels. Implementation of BMPs would avoid or minimize these construction-related effects. Increase in water temperatures could result from removal of riparian shading. Implementation of riparian revegetation on floodplain terraces and bioengineered measures on scour protection features would avoid or minimize these effects. Short-term, indirect effects to cui-ui downstream of Derby Dam resulting from sediment increases during construction. **Less than significant with BMPs and environmentally sustainable designs.**	Greater effect than Alternative 3 due to greater water quality effects from construction and more loss of riparian habitat, including riparian shading. Effects reduced to less than significant with BMPs and habitat mitigation. **Less than significant with BMPs and habitat mitigation.**

Table S-1 Comparison of Effects by Alternative ***Issue***			
Significance Criteria	**No-Action Alternative**	**Recommended Plan Alternative 3-Floodplain Terrace Plan**	**Alternative 2-Detention Plan**
Land Use			
Effects on Land Use			
Conflict with Applicable Habitat Conservation Plans	Zoning, management of land use, and development in the project area would continue in accordance with the NRS; Truckee Meadows Regional Plan; Washoe and Storey County codes, master plans, and area plans; City of Reno and Sparks codes, master plans, and area plans; and Tribal and Colony administration. Also, Truckee Meadows would continue to develop in areas outside the flood plain. Development closer to the Truckee River would continue to be abated by local ordinances.	No effect.	No effect.
Conflict with Land Use Plans, Policies or Regulations	Same as above.	While this alternative would require changes in land use designations within the proposed flood risk management system, the changes are not anticipated to significantly alter the goals of the affected community plans while addressing the flood risk reduction needs of these communities. **Less than significant.**	Greater effect than Alternative 3 because of larger project footprint; however, effect to land use plans, policies, and regulations still considered to be less than significant. **Less than significant.**
Support Development in the Base Floodplain	Same as above.	Reductions in the base (FEMA's 100-year) floodplain as a result of this alternative occur only in areas that are currently developed, and existing local ordinances strictly regulate further development in the base floodplain. Therefore, this alternative would not directly or indirectly support development in the floodplain. **Less than significant.**	Same as Alternative 3.
Physically Divide a Community	Same as above.	No effect.	

Table S-1 Comparison of Effects by Alternative ***Issue***			
Significance Criteria	**No-Action Alternative**	**Recommended Plan Alternative 3-Floodplain Terrace Plan**	**Alternative 2-Detention Plan**
Agriculture and Prime Farmlands			
Effects on Agriculture and Prime and Unique Farmland			
Convert Prime Farmland or Active Farmland of Statewide Importance	In the Truckee Meadows reach, agricultural practices have been shifting away from the Truckee River towards the South Meadows. Most agricultural activities within the project area in the Truckee Meadows reach are associated with the UNR Agricultural Main Station, which provides extension services, conducts research, and operates a commercial meat-packing endeavor for the UNR. Agriculture in the Lower Truckee River reach is primarily alfalfa crops and livestock grazing. Given the economic challenges of sustained active farm cultivation and the shift in water demand from irrigation to municipal and industrial supply within the region, it is expected that cultivation practices would continue to decline within the project area. Grazing practices would be expected to sustain current levels or slightly increase in the future.	Converts about 30 acres of prime and unique farmland and 19 acres of farmland with statewide and local importance to flood project features. Conversion rating is below significance threshold established by the National Farmland Protection and Preservation Act. Realignment of Pioneer Ditch outside of project features assumed to be pursued by TRFMA as a non-Federal sponsor relocation responsibility in order to avoid disruption of irrigation water deliveries to water rights holders. **Less than significant effect.**	Converts about 58 acres of prime and unique farmland and 24.5 acres of farmland with statewide and local importance to flood project features. Conversion rating is below significance threshold established by the National Farmland Protection and Preservation Act. Realignment of Pioneer Ditch outside of project features assumed to be pursued by TRFMA as a non-Federal sponsor relocation responsibility in order to avoid disruption of irrigation water deliveries to water rights holders. **Less than significant effect.**
Recreation and Open Space			
Loss of Recreation Opportunities			
Substantially Disrupt Institutionally Recognized Recreation Facility or Activity. Inconsistent With Truckee Meadows Regional Plan. Substantial Reduction in Availability of and Access to Recreational or Open Space Areas	The preservation and management of open space and recreational opportunities are key regional objectives for maintaining and improving quality-of-life benefits for residents in the region. As such, local efforts toward enhancing and expanding open space and recreational opportunities are expected to continue within the constraints of local budget availability.	Short-term loss or disruption to existing recreational and open space areas due to construction. Long-term benefit to recreational opportunities with construction of trails, open space, river access points, and picnic areas. **Beneficial effect.**	Same as Alternative 3.
Aesthetic Resources			
Effects to Aesthetic Resources			
Substantial Changes to Views of the Truckee River and other significant viewsheds in the Truckee Meadows.	Local and regional plans and ordinances would continue to be followed to preserve the natural function and scenic value of mountains, rivers, significant ridgelines, wetlands, aquifer recharge areas, and water bodies. Local and regional governments would continue to implement design guidelines to maintain the desired aesthetic quality of neighborhoods and communities.	Short-term effects to visual resources during construction. Long-term effect to views of the Truckee River from levees and floodwalls. Implimentation of BMPs and environmentally sustainable design would reduce effects to less than significant. **Less than significant with BMPs and environmentally sustainable designs.**	Greater effects to visual resources than Alternative 3 because of the larger footprint and proposed levees and floodwalls up Steamboat Creek and Boynton Slough. Implimentation of BMPs would reduce effect but floodwalls and levees along residential areas of Steamboat Creek and Boynton Slough would be considered significant. **Significant.**

Table S-1 Comparison of Effects by Alternative ***Issue***			
Significance Criteria	**No-Action Alternative**	**Recommended Plan Alternative 3-Floodplain Terrace Plan**	**Alternative 2-Detention Plan**
Traffic and Circulation			
Construction Effects to Traffic and Circulation			
Temporary Decrease in LOS to E or worse	Traffic conditions would worsen with continuing growth and development. Public transit services, bike, and pedestrian facilities are expected to remain the same or expand, depending on local funding.	Short-term, construction related effects to roadways in the project area. Implementation of construction traffic management plan would reduce effects to less than significant. **Less than significant with construction traffic management plan.**	Greater construction related effect to traffic and circulation than Alternative 3 due to larger construction footprint and lengthening of McCarran Boulevard Bridge. Implementation of construction traffic management plan would reduce effects to less than significant. **Less than significant with construction traffic management plan.**
Air Quality			
Construction Effects on Air Quality			
Exceedence of Federal, State, or Local Air Quality Standards Contribute Substantially to an Existing Exceedence of an Air Quality Standard	Hydrographic Area 87 – Truckee Meadows (Downtown Reno and Truckee Meadows reaches) is designated as a serious non-attainment area for 24-hour PM10. All other project areas are classified as an attainment area for all Federal CAA criteria pollutants. Washoe County District Board of Health would continue to manage air quality in the region, implementing emission-reduction requirements set forth by the SIP.	Construction emissions of all non-attainment or maintenance pollutants (CO, PM_{10}, NOx and VOC) are less than the de minimis thresholds. Compliance with Washoe County District Regulation 040.030 for the control of fugitive dust from construction activities along with obtaining and implementing the requirements set forth in the dust control permit for the project would further reduce PM_{10} and $PM_{2.5}$ construction emissions. **Less than significant.**	Same as Alternative 3.
Noise and Vibration			
Construction Effects on Noise and Vibration			
Substantial Increase in Noise or Vibration Levels Near Sensitive Receptors	Sources of noise and sensitive receptors are expected to remain the same in the future. Increasing noise is expected due to increasing regional traffic and development.	Increases in noise levels due to use of equipment during construction would exceed local noise limits at several locations in the project area. However, local ordinances do not place restrictions on construction noise levels during daylight hours. Construction-related vibration levels would be barely perceptible. Noise and vibration control measures would be implemented by the contractor to minimize noise effects to noise-sensitive receptors (primarily residential land uses). **Less-than-significant with BMPs.**	Same as Alternative 3.

Table S-1 Comparison of Effects by Alternative ***Issue***			
Significance Criteria	**No-Action Alternative**	**Recommended Plan Alternative 3-Floodplain Terrace Plan**	**Alternative 2-Detention Plan**
Socioeconomics			
Effects on Socioeconomic Conditions			
Induce Substantial Population Growth Displace Substantial Numbers of People or Housing Substantially Reduce Employment Opportunities or Income Levels Substantial Disruption to Public Service Providers	Current population and employment trends would continue. Levels of service provided by the public service sector would continue as indicated in the City and County General Plans. No relocation of residents out of the flood plain. Could reduce employment opportunities and/or income levels in the Downtown Reno reach and the Truckee Meadows reach because flooding would continue to threaten homes and businesses. Public service provider‘s or school‘s ability to provide a level of service that meets established standards would be affected when a flood occurs. The moratorium for building in the floodplain would continue, but that would still not provide a solution for existing threatened homes and businesses. The No Action Alternative could also displace substantial numbers of people during future flood events.	Short term construction related increase in employment. Reduction in disruption of public services and damages to properties following implementation of flood risk reduction measures. Long-term reduction in damages related to flooding, particularly for the Sparks commercial/industrial area north of the river and the Reno-Tahoe International Airport. **Beneficial**. Relocation of several structures and utilities from proposed alignment of levees and floodwalls would affect use of land and property value. However, compensation of lost value as required by Federal and State laws would reduce effect to parcel owners to less than significant. **Less than significant with compensation.**	Higher benefit to long-term socioeconomic conditions than Alternative 3 due to greater reduction in flood risk. **Beneficial.** Greater relocation requirements than Alternative 3 due to larger footprint and extension of features up Steamboat Creek and Boynton Slough would have a greater effect on socioeconomic conditions. Compensation of loss lost value per Federal and State requirements would reduce effects to less than significant. **Less than significant with compensation.**
Environmental Justice			
Environmental Justice Effects			
Disproportionate Adverse Effects on Ethnic Minorities or Low-Income Populations	Ethnic minorities and low-income individuals/families in the project area would continue to be exposed to the same level of flood risk and regional scarcity of recreational opportunities as the rest of the population in the project area.	No disproportionate environmental effects on minority and low-income individuals in the Truckee Meadows reach. Induced flows to Lower Truckee River may induce flooding in some agricultural and uninhabited parcels, including on PLPT reservation lands; however no structures or residences would be affected. Those parcels that may experience a change in the depth, duration, and frequency of flooding as a result of the project will be evaluated in PED to determine if the change is great enough to warrant a taking of the parcel. Preliminary model results indicate implementation of the project should only require the purchase of a flowage easement with no effect to the current use of the parcels. **Less than significant with purchase of flowage easements on PLPT reservation lands.**	Same as Alternative 3.

Table S-1 Comparison of Effects by Alternative ***Issue***			
Significance Criteria	**No-Action Alternative**	**Recommended Plan Alternative 3-Floodplain Terrace Plan**	**Alternative 2-Detention Plan**
Public Health and Safety			
Effects to Public Health and Safety			
Disrupt Emergency Response Plans or Services Substantial Increase in Vector Populations Substantial Increase in Wildlife Hazards to Aviation Safety Increased Risk of Wildland Fires	Police, fire, and emergency services would continue to provide services to the community. The USDA APHIS Wildlife Services would continue to work with the Reno Airport to ensure proper implementation of the Wildlife Hazard Management Plan to reduce wildlife hazards to aviation and ensure public safety.	Short term construction activities may: increase wildlife activity, increasing potential for wildlife strikes by aircraft at the Reno-Tahoe Airport; affect response times of police, fire, and emergency medical service vehicles; increase safety risks by construction equipment and train operators around railroad rights-of-way. **Less than significant with BMPs.** Project features could encroach into airspace maintained for maximum safety of aircraft landings. Coordination with FAA and Reno-Tahoe Airport Authority on project designs would reduce effect to less than significant. **Less than significant with design coordination with FAA and RTAA.** Project features could be an attractant to wildlife (burrowing animals to levees; birds, mammals to revegetated floodplain terraces), increasing potential for wildlife strikes by aircraft. Coordination with Reno-Tahoe Airport Authority on project designs and implementation of BMPs would reduce effect to less than significant. **Less than significant with design coordination with FAA and RTAA.** Floodwalls would obstruct the view of law enforcement personnel patrolling the Truckee River corridor. Coordination of designs with law enforcement offices would reduce effect however not to a level of less than significant. Significant effect. **Significant**. Riparian revegetation could provide new opportunities for breeding mosquito populations, increasing the risk of vector-diseases to be introduced to the public. Coordination with Vector Control agencies would reduce effect to less than significant. **Less than significant**.	Similar to Alternative 3; however, location of habitat mitigation proposed for this alternative is not identified, therefore, effects as a wildlife attractant that may affect aviation safety near the airport is unknown.

Table S-1 Comparison of Effects by Alternative ***Issue***			
Significance Criteria	**No-Action Alternative**	**Recommended Plan Alternative 3-Floodplain Terrace Plan**	**Alternative 2-Detention Plan**
Cultural Resources ***Effects to Cultural Resources***			
Substantial Alteration of NRHP Eligible Resources	Due to serious problems with deterioration, the NRHP-listed Virginia Street Bridge would require replacement. The Sierra Street and the NRHP-eligible Painted Rock Bridges would require rehabilitation or replacement at some point. Continued battering from high velocity flows and debris would eventually cause failure. Otherwise, adverse effects to known cultural resources are only likely to occur from abandonment or disrepair in the Downtown Reno or Truckee Meadows reaches. Currently, there is insufficient survey information for the Lower Truckee reach to determine effects resulting from the No Action Alternative.	Construction of levees and floodplain terraces south of the river along Mill Street would require removal of Ferrari Farm barn and outbuildings and alter the integrity of the Pioneer Ditch. The Sagewind/Bristlecone Mental Health Complex would also be removed. Development of an evaluation plan to determine these historic properties' potential NRHP eligibility. Assuming that any sites are found to be eligible, the PA requires development of a Historic Properties Treatment Plan (HPTP), in consultation with SHPO. The HPTP would guide the level of data recovery, or mitigation. The main requirements of the contents of a research design and HPTP are is in Appendices 1 and 2 of the PA. In most cases archeology sites would be excavated and historic buildings, structures or objects would minimally be recorded with Historic American Building Survey (HABS) or Historic American Engineering Record (HAER) specifications and possibly relocated to a new location if they are to be removed for a project action. **Less than significant with implementation of mitigation measures developed through the PA.**	Same as Alternative 3, but including removal of the Jones Ranch creamery building on the UNR Farms property east of McCarran Boulevard and . The Young and Georges Ranch/J. Guery's house, site 26Wa4584.

Table S-1 Comparison of Effects by Alternative ***Issue***			
Significance Criteria	**No-Action Alternative**	**Recommended Plan Alternative 3-Floodplain Terrace Plan**	**Alternative 2-Detention Plan**
Indian Trust Assets			
Effects to Indian Trust Assets			
Loss, Damage, Unlawful Alienation, Waste, or Depletion of Indian Trust Assets Loss of Treaty-Based Fishing, Hunting, Gathering, or Similar Rights of Access and Resource Use on Traditional Tribal Lands	Greater flow and the capacity to manage such water, TROA would assist in improving lower river water quality; enhance the elevation of Pyramid Lake; enhance the riparian canopy in and stabilize the lower river; enhance recreational opportunities at Pyramid Lake; enhance spawning opportunities for cui-ui; and enhance river habitat for Pyramid Lake fishes. Recovery efforts by USFWS would continue for the endangered cui-ui and threatened Lahontan Cutthroat trout. Purchase of additional water rights under the Water Quality Settlement is expected to be completed, dedicating additional flows to Pyramid Lake and minimally improving water quality in the Lower Truckee. The Pyramid Lake Paiute Tribe would continue to pursue grants to stabilize riverbanks and protect farmland adjacent to the river. Livestock grazing is expected to be maintained at current levels on tribal land. With implementation of TROA, the Pyramid Lake Paiute Tribe has full discretion to invest and manage the $40 million Pyramid Lake Paiute Economic Development Fund. Removal of Numana Dam would be completed by the PLPT with support and funding from BIA and USBOR, improving upstream migration of fish, including cui-ui. Inundation of Tribal agricultural land within the river‘s floodplain would continue, depositing sediment, naturally shifting the channel in this dynamic reach of the river, and blowing out rock diversion structures at high flow events.	Induced flows to Lower Truckee River may induce flooding in some agricultural and uninhabited parcels, including on PLPT reservation lands; however, no structures or residences would be affected. Those parcels that may experience a change in the depth, duration, and frequency of flooding as a result of the project will be evaluated in PED to determine if the change is great enough to warrant a taking of the parcel. Preliminary model results indicate implementation of the project should only require the purchase of a flowage easement with no effect to the current use of the parcels. **Less than significant with purchase of flowage easements on PLPT reservation lands.** Short-term changes in water temperature from removal of riparian shading, which could indirectly affect Pyramid Lake fisheries, would be reduced to less than significant with reestablishment of riparian vegetation along floodplain terraces and within bioengineered scour protection features. **Less than significant with implementation of environmentally sustainable design.** Construction of levee on Reno-Sparks Indian Colony land would require a non-standard estate purchase of a levee easement through BIA. However, long-term reduction in flood risk to RSIC land would provide economic benefit to the tribe. **Less than significant with purchase of levee easement on RSIC land.**	Same as Alternative 3.

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Volume II

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ACRONYMS AND ABBREVIATIONS

AA	attainment area
ACE	annual chance exceedence
ADT	average daily traffic
AEP	annual exceedence probability
APE	area of potential effect
AST	above-ground storage tanks
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	best management practices
CAA	Clean Air Act
CAR	Coordination Act Report
CDFG	California Department of Fish and Game
cfs	cubic feet per second
CO	carbon monoxide
CWA	Clean Water Act
DB	disturbed/bare habitat
dB	decibels
dBA	A-weighted sound levels
DO	dissolved oxygen
DPS	distinct population segments
DRI	Desert Research Institute
DWR	California Department of Water Resources
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order
ERDC	Engineer and Research Development Center
ESA	Endangered Species Act
ET	evapotranspiration
EWM	emergent wetland/marsh habitat
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FONSI	finding of no significant impact
FPCC	Flood Protection Coordinating Committee
FRM	flood risk management
FTA	Federal Transit Administration
FHWA NAC	Noise Abatement Criteria
GRR	general reevaluation report
HAER	Historic American Engineering Record
HCM	Highway Capacity Manuel
HEC-RAS	Hydrologic Engineering Centers River Analysis System
HPTP	Historic Properties Treatment Plan
HTRW	hazardous, toxic, and radiological waste
I-80	Interstate 80
Interior	Department of the Interior

ITA	Indian trust assets
L_{eq}	equivalent energy noise levels
LCT	Lahontan cutthroat trout
LOS	levels of service
LPP	locally preferred plan
M&I	municipal and industrial
MOA	memorandum of agreement
MOU	memorandum of understanding
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NCP	Noise Control Plan
NDCNR	Nevada Department of Conservation and Natural Resources
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NDWRP	Nevada Department of Water Resource Planning
NDEP	Nevada Division of Environmental Protection
NED	National Economic Development
NEPA	National Environmental Policy Act
NER	National Ecosystem Restoration
NAA	non-attainment area
NNDA	Northern Nevada Development Authority
NNHP	Nevada Natural Heritage Program
NOI	Notice of Intent
NO_X	nitrous oxides
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resource Conservation Service
NRF	native riparian forest habitat
NRHP	National Register of Historic Places
NRS	Nevada Revised Statutes
NTU	Nephelometric Turbidity Units
NWAP	Nevada Wildlife Action Plan
O_3	Ozone
O&M	operation and maintenance
OCAP	operating criteria and procedures
OSHA	Occupational Safety and Health Administration
OWPR	open water/pond/riverine habitat
PA	programmatic agreement
Pb	Lead
PCB	polychlorinated biphenyls
PCE	Perchloroethylene
PED	pre-construction engineering and design
PLPT	Pyramid Lake Paiute Tribe
$PM_{2.5}$	fine particulate matter
PM_{10}	inhalable particulate matter
PPV	peak particle velocity
RCN	Roadway Construction Noise Model
RCRA	Resource Conservation and Recovery Act
REMSA	Reno Emergency Medical Services Authority
RM	river mile
RMHQ	requirements to maintain existing higher quality

ROD	record of decision
RNO	Reno-Tahoe International Airport
RSIC	Reno-Sparks Indian Colony
RTC	Regional Transportation Commission
RTP	Regional Transportation Plan
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SHPO	Nevada State Historic Preservation Officer
SIP	State Implementation Plan
SO_2	sulfur dioxide
SOI	sphere of influence
SR	state route
SWPPP	Storm Water Pollution Prevention Plan
TCID	Truckee-Carson Irrigation District
TDS	total dissolved solids
TMDL	total maximum daily load
TMRPA	Truckee Meadows Regional Planning Agency
TMWA	Truckee Meadows Water Authority
TMWRF	Truckee Meadows Water Reclamation Facility
TNC	The Nature Conservancy
TNM2.5	Traffic Noise Model, Version 2.5
TRAction	Truckee River Action
TRI	Tahoe Reno Industrial Center
TROA	Truckee River Operating Agreement
TTSA	Tahoe-Truckee Sanitation Agency
U.S. PIRG	U.S. Public Interest Research Group
UNHSG	upland native herbaceous/shrub/grassland habitat
UNNH	upland non-native herbaceous habitat
UNR	University of Nevada, Reno
USACE	U.S. Army Corps of Engineers
USBOR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USEPA	U. S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tanks
VdB	vibration decibels
VOC	volatile organic compounds
VRAP	visual resource assessment procedure
WCAQMD	Washoe County Air Quality Management Division
WCWCD	Washoe County Water Conservation District
WET	Water Engineering and Technology, Inc.
WHA	wildlife hazard assessment
WLA	waste load allocation
WMWS	willow/mixed willow scrub habitat
WQCP	water quality control plan
WRDA	Water Resources Development Act
WS	Animal Plant Health Inspection Service, Wildlife Service
WTNC	Washoe Tribe of Nevada and California

CHAPTER 1. ENVIRONMENTAL PROCESS

1.1 PURPOSE OF ENVIRONMENTAL IMPACT STATEMENT

The U.S. Army Corps of Engineers (USACE), Sacramento District, has prepared a General Reevaluation Report (GRR) to reconsider the original Truckee Meadows Flood Control Project, Nevada, that was authorized by Congress in 1988. This Environmental Impact Statement (EIS) is a companion document to the GRR, and has been prepared pursuant to, and in accordance with, the requirements of the National Environmental Policy Act (NEPA). The EIS evaluates the potential effects of the alternatives, which combine flood risk management and basic recreation features, on the environmental resources along the Truckee River from Reno to Pyramid Lake (Figure 1-1). USACE is the Federal lead agency for the EIS, and the Truckee River Flood Management Authority (TRFMA) is the non-Federal sponsor for the GRR.

1.2 PUBLIC SCOPING

Early in the environmental process, USACE engaged in public scoping to help identify environmental issues and concerns related to the Truckee Meadows Flood Control Project. "Scoping" is defined in the NEPA regulations as "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (40 C.F.R. § 1501.7). Scoping is part of the required process for the development and preparation of the EIS, consisting of a variety of activities including notices, meetings, and workshops. The process "ends" once the issues and alternatives to be addressed in the EIS have been clearly identified.

Scoping for the project began with distribution of a formal Notice of Intent (NOI) to agencies, organizations, Tribes, and the public. The NOI was also posted in the *Federal Register* in May 1998 as required by NEPA. The NOI was intended to encourage interagency communication and provide sufficient background information to generate specific comments and questions on the scope and content of the EIS. USACE then held a formal public scoping meeting on June 10, 1998, in Reno to discuss the project and receive public comments. Subsequent public outreach meetings, workshops, and notifications were provided on numerous occasions throughout the years. Additional details on scoping and public outreach are included in Chapter 9.

1.3 PREPARATION AND REVIEW OF EIS

Preparation of an EIS is required when a major Federal action such as an authorization or approval is being considered and may have significant effects on the quality of the natural and human environment. Based on both agency expertise and issues raised during scoping, the agency prepares the EIS with a full description of the affected environment, a reasonable range of alternatives, including the "no action" alternative, and an analysis of the effects of each alternative. For this EIS, USACE, TRFMA, other agencies, and contracted subject specialists worked together to research, organize, and document both the complex nature of the project area and the detailed results of the environmental evaluation.

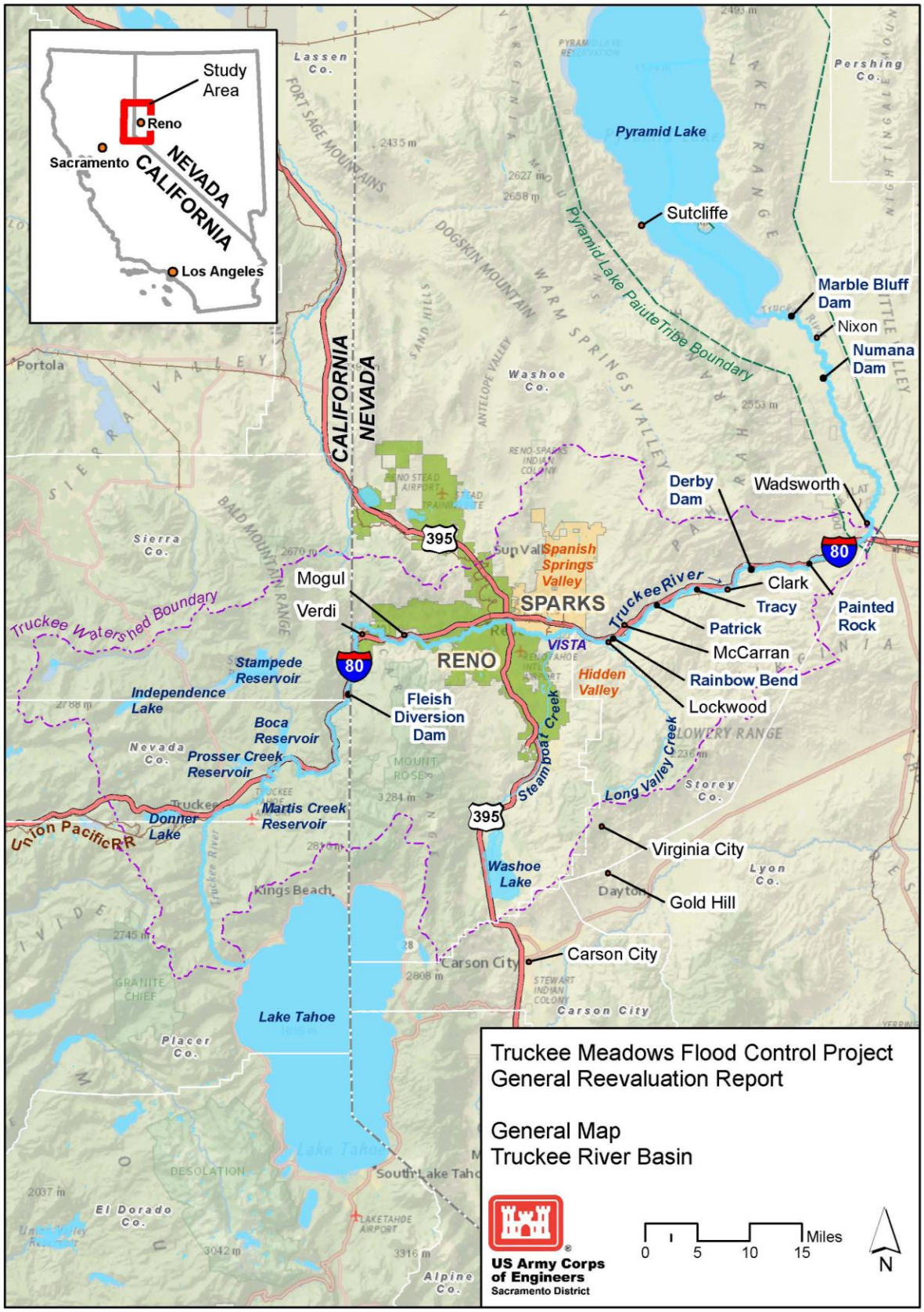


Figure 1-1. General and Vicinity Map, Truckee River Basin.

Once completed, the EIS will be made available for public review and comment in accordance with NEPA. First, a formal Notice of Availability of the EIS will be published in the *Federal Register*, and then Federal, State, and local agencies, organizations, and interested individuals will receive either a CD copy or a notice of availability with the Sacramento District's website address where the document can be viewed. The EIS will be made available for review for 45 days, and public meetings will be held during the review periodto present the alternatives, answer any questions, and encourage comments. All comments received will be considered carefully and incorporated into the final document, as appropriate. The comments and responses will be summarized in the final EIS and included in an appendix to the final EIS.

1.4 RECORD OF DECISION

Once the final EIS is completed, a Notice of Availability will be published in the *Federal Register* and local newspapers, indicating that the final EIS will be available for a 30-day review period before USACE makes a final decision whether or not to approve implementation of the proposed action. After considering any additional comments, USACE will sign a Record of Decision (ROD) for the project. The ROD is a written, public record explaining why USACE chose a particular course of action. The selected action and any practicable mitigation measures will be identified in the ROD. The proposed action cannot be initiated before the ROD is signed and approved. In addition, project construction is also contingent on congressional authorization and appropriation of funds.

1.5 ORGANIZATION OF EIS

This EIS has been prepared in compliance with NEPA. The document introduces the project, discusses the alternatives, describes existing environmental conditions, evaluates potential environmental effects, summarizes compliance with applicable environmental laws and regulations, discusses public involvement efforts, and provides other support information. The EIS is organized into 11 chapters as summarized below:

Chapters 1 and 2 provide introductory information on the environmental process and the background of the project and project area. This includes a detailed discussion of the purpose and need for the project, as well as the significant issues raised during scoping. Chapters 3 and 4 discuss the formulation of the alternatives and describe the features of final alternatives, including the no action (future without-project) alternative. Chapters 5, 6, and 7 describe the affected environment; evaluate the consequences of the alternatives on resources; and propose measures to mitigate for any significant effects. Chapter 8 summarizes compliance with Federal laws and Executive Orders, while Chapter 9 details public involvement and agency coordination activities. Chapters 10 and 11 include the EIS preparers and references, respectively.

The EIS also includes numerous tables, figures, and appendixes. The tables and figures are included within the text. The tables provide specific information and summarize main points in the text. The figures and plates illustrate current conditions, features of the alternatives, and environmental conditions and effects. The appendices provide the detailed analyses, correspondence, and other information that support the discussion in the EIS. Comments received from the public review of the draft EIS and USACE responses to those comments are found in Appendix H.

CHAPTER 2. PROJECT BACKGROUND

2.1 HISTORY OF PROJECT

The Truckee Meadows Flood Control Project was authorized under Water Resources Development Act (WRDA), Pub. L. No. 100-676, § 3(a)(10), 102 Stat. 4012 (1988). However, the project was deferred during the preconstruction engineering and design (PED) phase when changes in real estate costs made the project economically infeasible. In 1996, the local communities requested that flooding problems in Truckee Meadows be reevaluated. The decision was also made to expand the study area beyond Truckee Meadows and consider ecosystem restoration as a possible project purpose. In 2006, at the request of the TRFMA and the Pyramid Lake Paiute Tribe (PLPT), fish passage improvement along the Truckee River was added as an ecosystem restoration objective.

This EIS, and the companion GRR document, summarize the plan formulation process for a comprehensive solution to water resources related problems in the Truckee River watershed. USACE initially sought to identify a comprehensive solution for flood, ecosystem and recreation problems including detailed evaluation of a locally developed plan resulting from a community coalition process. Despite several iterative attempts, those efforts did not result in a project that USACE could recommend. Therefore, in 2012, in coordination with TRFMA, the study was re-scoped to focus plan formulation on flood risk management with basic recreation features. The primary purpose of the re-scoped reevaluation study was to assess the feasibility of modifying the Federally authorized project to reduce flood damages in the Truckee Meadows project area while avoiding or minimizing adverse effects.

2.1.1 Authorization

The Truckee Meadows Flood Control Project[3] was authorized by WRDA 1988, § 3(a)(10), which reads:

> Truckee Meadows, Nevada.--The project for flood control, Truckee Meadows, Nevada: Report of the Chief of Engineers, dated July 25, 1986, at a total cost of $78,400,000, with an estimated first Federal cost of $39,200,000 and an estimated first non-Federal cost of $39,200,000; except that the Secretary is authorized to carry out fish and wildlife enhancement as a purpose of such project, including fish and wildlife enhancement measures described in the District Engineer's Report, dated July 1985, at an additional total cost of $4,140,000.

After a general reevaluation of the authorized project was initiated, the 1990 Tribes Water Rights Settlement Act, § 207, provided direction regarding the conduct of the study as follows:

> The Secretary of the Army, in consultation with and with the assistance of the Pyramid Lake Tribe, State of Nevada, Environmental Protection Agency, the Secretary [of Interior], and other interested parties, is authorized and directed to incorporate into its ongoing reconnaissance level study of the Truckee River, a study of the rehabilitation of the lower Truckee River to and including the river terminus delta at Pyramid Lake, for the benefit of the Pyramid Lake fishery. Such study shall analyze, among other relevant factors, the feasibility of:
>
> - Restoring riparian habitat and vegetative cover
> - Stabilizing the course of the Truckee River to minimize erosion
> - Improving spawning and migratory habitat for the cui-ui

[3] A previous USACE project was authorized and constructed pursuant to the FCA 1954, § 203, and the FCA 1962, § 203.

- Improving spawning and migratory habitat for the Lahontan cutthroat trout
- Improving or replacing existing facilities, or creating new facilities, to enable the efficient passage of cui-ui and Lahontan cutthroat trout through or around the delta at the mouth of the Truckee River, and to upstream reaches above Derby Dam, to obtain access to upstream spawning habitat.

The Secretary of the Army received additional guidance regarding USACE's conduct of the GRR pursuant to the House Report associated with EWDAA 1996, providing:

> The Secretary of the Army is directed to initiate a general reevaluation report for the Truckee Meadows Flood Control project, Nevada, authorized in the Water Resources Development Act of 1988. Of the $400,000 provided in the conference agreement for the lower Truckee River, Nevada, project, $50,000 is appropriated for this investigation. The report will consider additional flood protection at and below Reno, Nevada, through levee/channel improvements, local impoundments, and potential reoperation of existing reservoirs in the watershed. The report will also consider the potential for environmental restoration along the Truckee River and tributaries in the Reno-Sparks area.

During the current general reevaluation, EWDAA 2006, § 113, was passed, which states:

> Truckee Meadows Flood Control Project, Nevada: The non-Federal funds expended for purchase of lands, easements and rights-of-way, implementation of project monitoring and assessment, and construction and implementation of recreation, ecosystem restoration, and water quality improvement features, including the provision of 6,700 acre-feet of water rights no later than the effective date of the Truckee River Operating Agreement for revegetation, reestablishment and maintenance of riverine and riparian habitat of the lower Truckee River and Pyramid Lake, whether expended prior to or after the signing of the Project Cooperation Agreement (PCA), shall be fully credited to the non-Federal sponsor's share of costs for the project: Provided, that for the purposes of benefit-cost ratio calculations in the General Reevaluation Report (GRR), the Truckee Meadows Nevada Flood Control Project shall be defined as a single unit and non-separable.

2.1.2 The 1988 Authorized Plan

The 1988 authorized plan is described in the Truckee Meadows (Reno-Sparks Metropolitan Area), Nevada, Feasibility Report and Environmental Impact Statement, February 1985. The layout of the 1988 authorized plan is shown in Figure 2-1, and the main features of the plan are provided below.

Flood Control Features

According to the 1985 feasibility report, the authorized plan was designed to provide "100-year flood protection" (1% Annual Chance Exceedence (ACE), also referred to as 1:100 or 1/100) to the Reno-Sparks area. The flood control features included approximately 5 miles of floodwalls, 7 miles of levees, and the replacement of 6 bridges along the Truckee River. Channel excavation was required near Booth Street, Wingfield Island, and Glendale Park. Also, a 900-acre detention basin and backwater levees along Steamboat Creek and Boynton Slough were proposed to mitigate a potential increase in downstream flood damages from the flood control measures. Backwater levees would also have extended along North Truckee Drain to just north of the Interstate-80 (I-80) crossing.

Recreation Facilities

Recreation facilities included seven new access sites and improvements to existing Riverside Park and to the Riverwalk area in downtown Reno. Of the approximately 22.7 miles of existing and proposed pedestrian/bike paths, 14.4 miles would have been new paths (including 1,600 feet along an existing road) and 300 feet of widened existing path. Of the proposed new paths and paths on existing roads, 4.6 miles

were proposed on the Truckee River, and 9.8 miles were proposed along the detention basin, Steamboat Creek, and Steamboat Marsh. These paths were to link existing and proposed recreation access sites, and provide access to flood control areas. The recreation access sites were to provide facilities and opportunities for fishing, swimming, rafting/tubing, and picnicking.

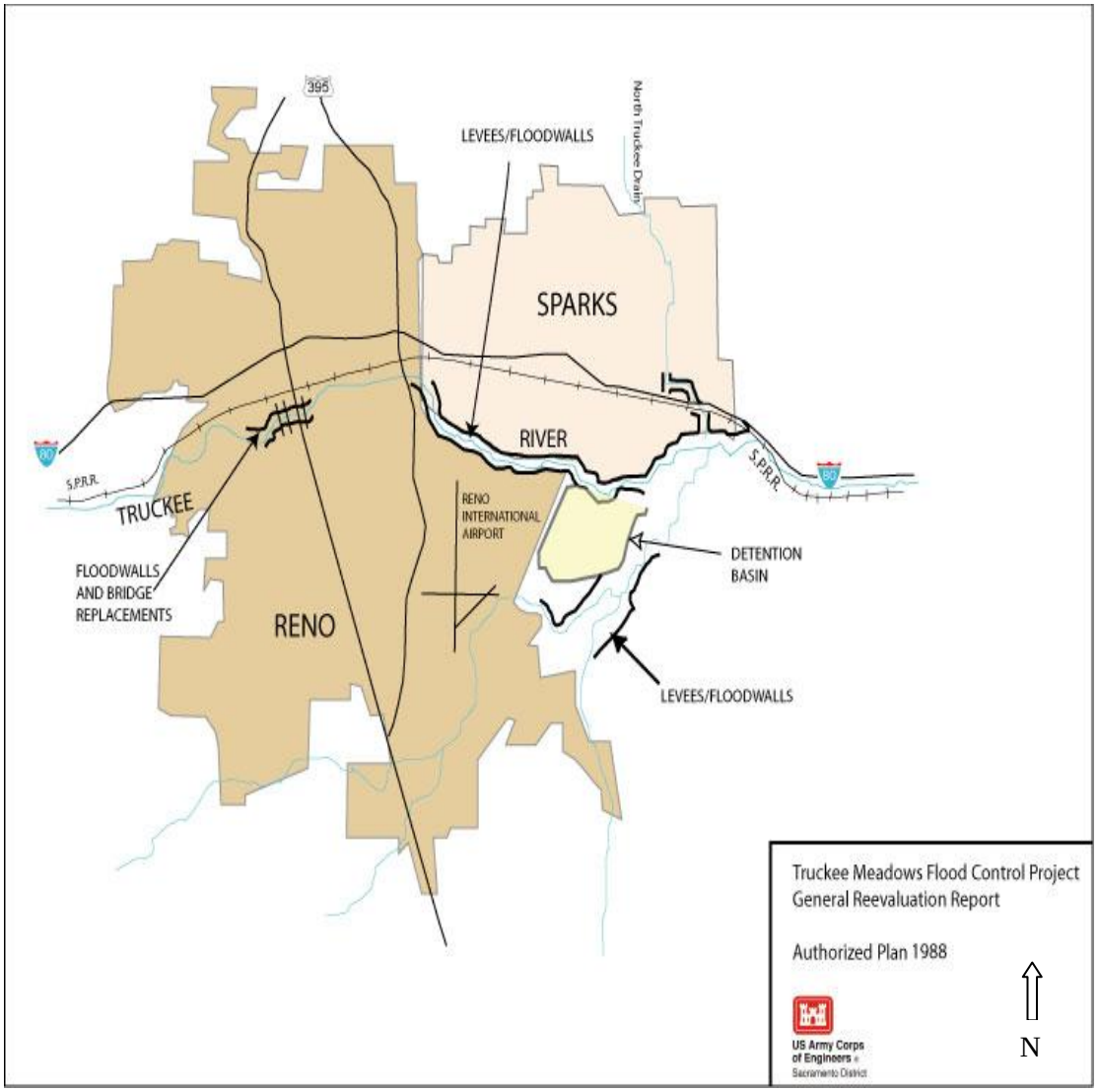


Figure 2-1. 1988 Authorized Plan (map not to scale).

A new pedestrian/bike bridge was also proposed, and bike lanes were proposed on the new Booth Street, Lake Street, and Pembroke Drive bridges, and on the bridge across Boynton Slough on South McCarran Boulevard. Ten sets of steps leading to the river, four observation decks, 10 locator or interpretive signs, and six rafting/tubing launch/exits were to be distributed along the Truckee River. Specifically, the major rafting/tubing accesses were proposed at Riverside Park (exit structure), Greg Street Park (launch/exit structure), Mill Street Park (no structure required – launch/exit access by riverbank), Riverbend Access (launch/exit structure), and Basin River Access (exit structure).

Fish and Wildlife Enhancement Features

Fish and wildlife enhancement measures consisted of 10 acres of riparian plantings, 300 acres of

marsh habitat preservation, and fish habitat improvements. While the enhancement measures were not included in USACE's recommended plan, the enhancement measures were specifically authorized by Congress. The fish and wildlife enhancement components authorized by Congress were only located within the Truckee Meadows reach.

2.2 LOCATION OF PROJECT AREA

As shown on Figure 1-1, the authorized investigation area includes the Truckee River watershed in the states of California and Nevada. The primary focus of the investigation is along the Truckee River and its tributaries.

The Truckee River basin in eastern California and western Nevada encompasses approximately 3,060 square miles. The drainage area upstream from Reno includes 1,067 square miles of mountainous terrain on the eastern slope of the Sierra Nevada mountain range, the crest of which forms the western boundary of the basin. The Truckee River has its headwaters in California's Sierra Nevada mountains (elevation over 8,000 feet above sea level) from which it flows into the southern end of Lake Tahoe (elevation 6,200 feet) (DWR, 1991). This portion of the river is typically referred to as the "Upper Truckee River."

The Truckee River exits from the northwestern shore of Lake Tahoe, where its flows are regulated by Lake Tahoe Dam, in Tahoe City. Lake Tahoe Dam is a small outlet structure that operates the lake's upper 6.1 feet and regulates the amount of water released from the lake into the Truckee River (DWR, 1991). Nearly all of the basin's storage and precipitation are located in California. The river flows northward approximately 15 miles through a small canyon to the town of Truckee, California. The only tributaries of any size in this canyon reach are Bear Creek and Squaw Creek. The next significant tributary is Donner Creek, which joins the river just upstream of Truckee; a small dam on Donner Lake controls flow in Donner Creek. Just downstream of the town of Truckee is the Martis Creek tributary, on which a flood control dam and reservoir were constructed in 1974.

The Little Truckee River is the next major tributary to the Truckee River. The Little Truckee watershed drains a portion of the Sierra Nevada range north and east of the town of Truckee. Stampede and Boca reservoirs are located on the Little Truckee just before its confluence with the Truckee River. Below the confluence, the Truckee River flows through a deep canyon below Farad, where the river enters Nevada.

Just east of the town of Verdi, Nevada, the river transitions from the more channelized upstream canyon into a broad plain historically known as the Truckee Meadows. The Truckee Meadows is a bowl-shaped valley and alluvial fan area bounded by the Sierra Nevada mountain range to the west and the Virginia and Pah Rah Ranges on the east. The floodplain is broad and expansive due in part to a geologic formation in the channel near Vista. The "Vista Narrows," composed of hard volcanic material, constricts outflows from the Truckee River into the Lower Truckee River canyon, backing up flood flows throughout the Meadows.

Within the Truckee Meadows, the Reno city limit begins within the transitional area between steep canyons to broad plain, with parts of downtown Reno located within a steeply banked reach of the river. Downtown Reno, considered the central business district, consists of dense urban development with residential, commercial, tourist, and public structures. There are existing floodwalls along the river through much of this reach until about Lake Street.

Just east of Highway 395 the broad plain of the Truckee Meadows becomes much more

pronounced along the river. The river flows through the plain for approximately 6 miles until it enters the mouth of the Lower Truckee River Canyon. The city of Sparks is located predominantly to the north on this stretch of the river. Two major tributaries, Steamboat Creek, and the North Truckee Drain, flow into the river between Highway 395 and Vista. The total drainage area of the Truckee River to this point at Vista is about 1,500 square miles.

Downstream of the cities of Reno and Sparks and Truckee Meadows area, the river flows eastward into a narrow canyon with small overflow areas. The Truckee River downstream of Vista passes small communities including Rainbow Bend, Patrick, Painted Rock, and Wadsworth. In addition to small farming and ranching establishments, a large industrial park and gravel mining operations are located within this stretch of the river. Midway between Vista and Wadsworth, Derby Dam diverts Truckee River water via the Truckee Canal to the Newlands Project, located in the adjacent Carson River watershed.

Just upstream of Wadsworth, the Truckee River enters the Pyramid Lake Paiute Reservation, and the direction of flow changes northward between the Pah Rah Range and the Truckee Range. Wadsworth is located within a broader plain between the ranges; however, farther downstream of the town the river again enters a narrow canyon. Numana Dam, constructed by the Bureau of Indian Affairs (BIA) to divert river water to farms on the reservation, is located in this portion of the river. The river then flows past the town of Nixon and on to Marble Bluff Dam before reaching its terminus at Pyramid Lake.

2.3 PURPOSE AND OBJECTIVES

2.3.1 Purpose of the General Reevaluation

The primary purpose of the reevaluation study is to assess the feasibility of modifying the Federally authorized project to reduce the risk of flood damages in the Truckee Meadows project area with consideration given to recreation and fish passage measures where technically and economically feasible. The GRR analyzes the current flood, ecosystem, and recreation problems, and develops alternatives to reduce flood risks, improve fish passage in the Truckee River, and increase recreational opportunities in the project area.

These alternatives include the no action (future without-project) alternative and various combinations of structural and non-structural measures. The engineering, economic, and environmental feasibility of the alternatives is evaluated, and the optimal alternative is identified. If the optimal alternative is found to be feasible and comparable to the plan authorized by WRDA 1988, the alternative will be recommended and carried forward for continued PED and construction. If the recommended plan is not consistent with the authorized plan, the plans will need to be compared, and the new plan will likely require that Congress modify the current authorization.

2.3.2 Planning Objectives

The purpose of a project is often defined by the planning objectives formulated to address the project area's problems and opportunities. Planning objectives are an expression of public and professional concerns about the use of water and related land resources resulting from the analysis of existing and future conditions in the project area. Planning objectives represent desired positive changes in the future without-project conditions. The planning objectives for the Truckee Meadows project would be attained within the 50-year period of analysis for the study, beginning in 2015. The planning objectives for flood risk management, fish passage improvement, and recreation per the GRR are listed below.

Flood Risk Management Objectives

- Reduce flood damages in the Downtown Reno and Truckee Meadows reaches along the Truckee River and tributaries from overbank flows to the fullest extent practical or feasible from a technical and economic standpoint..
- Reduce the potential for loss of life from flooding from the Truckee River.

Fish Passage Improvement Objectives

- Improve fish passage at the dams and water diversion structures along the Truckee River between Lake Tahoe and Pyramid Lake.

Recreation Objectives

- Increase recreational opportunities along the Truckee River between Highway 395 and Vista.

2.4 PROBLEMS AND NEED

The need for the project is evidenced by the significant flooding experienced within the project area, the obstruction of fish passage for spawning fish species from Pyramid Lake as a result of numerous artificial barriers within the river, and the increased demand for recreational opportunities within the Reno-Sparks Metropolitan Area due to the significant increase in population experienced by the region.

2.4.1 Flooding and Flood Damage

Historically, the Truckee River has been prone to flooding, which continues to pose a public health threat to downtown Reno and the downstream communities of Sparks, Rainbow Bend, and Wadsworth. Development in the Truckee Meadows reach also incurs substantial damages due to flooding. The current flooding problems and need for a flood risk management project are summarized below:

- Flooding poses a threat to life and safety in downtown Reno and Truckee Meadows.
- Flooding incurs substantial damages to development in the Downtown Reno and Truckee Meadows reaches.

A discussion of the flooding problem follows.

History of Flooding

The Reno-Sparks-Truckee Meadows area has a long history of floods. Floods in the project area are caused by melting snow, cloudbursts, and heavy general rains. Rain floods, which normally occur during the period from November through April (characterized by high peak flows and short duration), have caused the major flood problems in the area. Early accounts indicate that flooding or periods of high water occurred during December 1861, January and February 1862, December 1867, January 1886, and May 1890. Since 1900, significant damaging rain floods occurred in 1907, 1909, 1928, 1937, 1950, 1955, 1963, 1986, 1997, and 2005.

Since about 1960, flood control works, consisting of reservoirs and channel modifications, have reduced the magnitude and frequency of flooding in the area. The 1950, 1955, 1986, 1997, and 2005 floods were similar in magnitude and were the most damaging because they occurred after residential and business areas of Reno began to spread to the south and southwest.

Downtown Reno

Parts of downtown Reno are in a steeply banked reach of the river. However, portions of the floodplain experience a sheet flow of water back into the river primarily from several areas where water overflows the banks, generally on the south side of the river around Idlewild Park and on the river's north side just upstream of Booth Street Bridge to the Lake Street Bridge. During times of high flow, structures within the first several blocks of the river tend to become inundated up to 6 feet or more when the river flows through this part of the city. This flow pattern has been documented more than once in recent times. The estimated average non-damaging channel capacity through the downtown reach is approximately 14,000 cubic feet per second (cfs). Overtopping of the existing floodwalls begins at approximately 15,000 cfs. For downtown Reno, the probability of flooding in any given year under existing conditions is 1 in 45 (approximately 2 percent). The currently estimated 1% chance peak flow at Reno in any given year is about 20,700 cfs.

The existing floodplains in downtown Reno for the 20-, 50-, and 100-year events are shown in Figure 2-2. As indicated by Figure 2-2, the 50- through 100-year events are generally located contiguous to the main river corridor.

Truckee Meadows

The Truckee River emerges from the more channelized downtown Reno area into the broader plains of the Truckee Meadows. It is this area that receives the greatest inundation of flood flows. The meadows area attenuates large flood volumes from the Truckee River. The flooding in this area is characterized by ponding caused by hydraulic backwater effects from Steamboat Creek at its confluence with the Truckee River and from a natural bedrock outcrop in the Truckee River channel near Vista called the "Vista Narrows." The floodplain here is wide and expansive since the bedrock retards the flow of the river, creating a bottleneck.

Flooding around the Reno-Tahoe International Airport consists of sheet flow up to McCarran Boulevard. Flooding in the industrial area of this reach consists of both ponding and sheet flow. Flood-related problems in this area are aggravated by flood flows from Steamboat Creek, Boynton Slough, and Dry Creek. The estimated average non-damaging channel capacity through the Truckee Meadows is approximately 10,000 cfs. Minor flooding of parks and roadways adjacent to the river begins at between 6,000 to 9,000 cfs (approximately equal to the 20% ACE or "5-year event"). Flooding that affects adjacent warehouse and other structures begins between 10,000 cfs to 12,000 cfs, or about the 1in 20 to 1 in 35 chance event.

The existing condition floodplains for the 20-, 50-, and 100-year events for the Truckee Meadows are shown in Figure 2-3. As shown on this map, the current floodplains cover a large area and include the Reno-Tahoe International Airport, a significant portion of the Sparks commercial/industrial area, the University of Nevada, Reno (UNR) farm lands, the commercial/industrial area of Reno located around the airport, and residential areas along the Steamboat Creek floodplain.

Physical damages caused by inundation losses or flood fighting preparation costs are the main types of flood damages within the floodplain. Physical damages include damages to, or loss of, buildings and their contents, raw materials, goods in process, and finished products awaiting distribution. Other physical damages include damages to lot improvements such as damages to roads, utilities and bridges, and cleanup costs. Additional costs are incurred during flood emergencies for evacuation and reoccupation, flood fighting, and disaster relief. Loss of life or impairment of health and living conditions are intangible damages that cannot be evaluated in monetary terms and have not been included in this analysis.

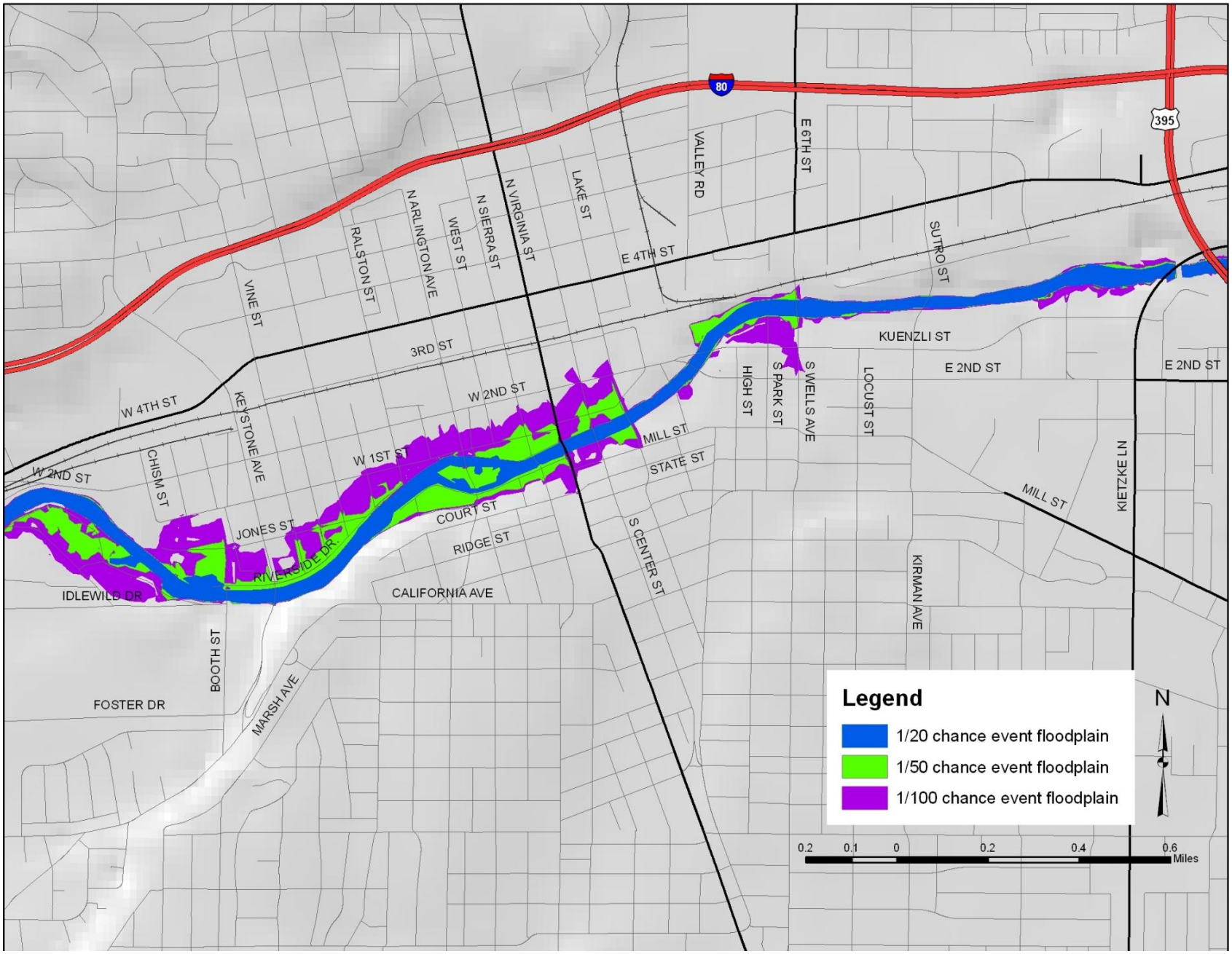


Figure 2-2. Downtown Reno Existing Floodplains.

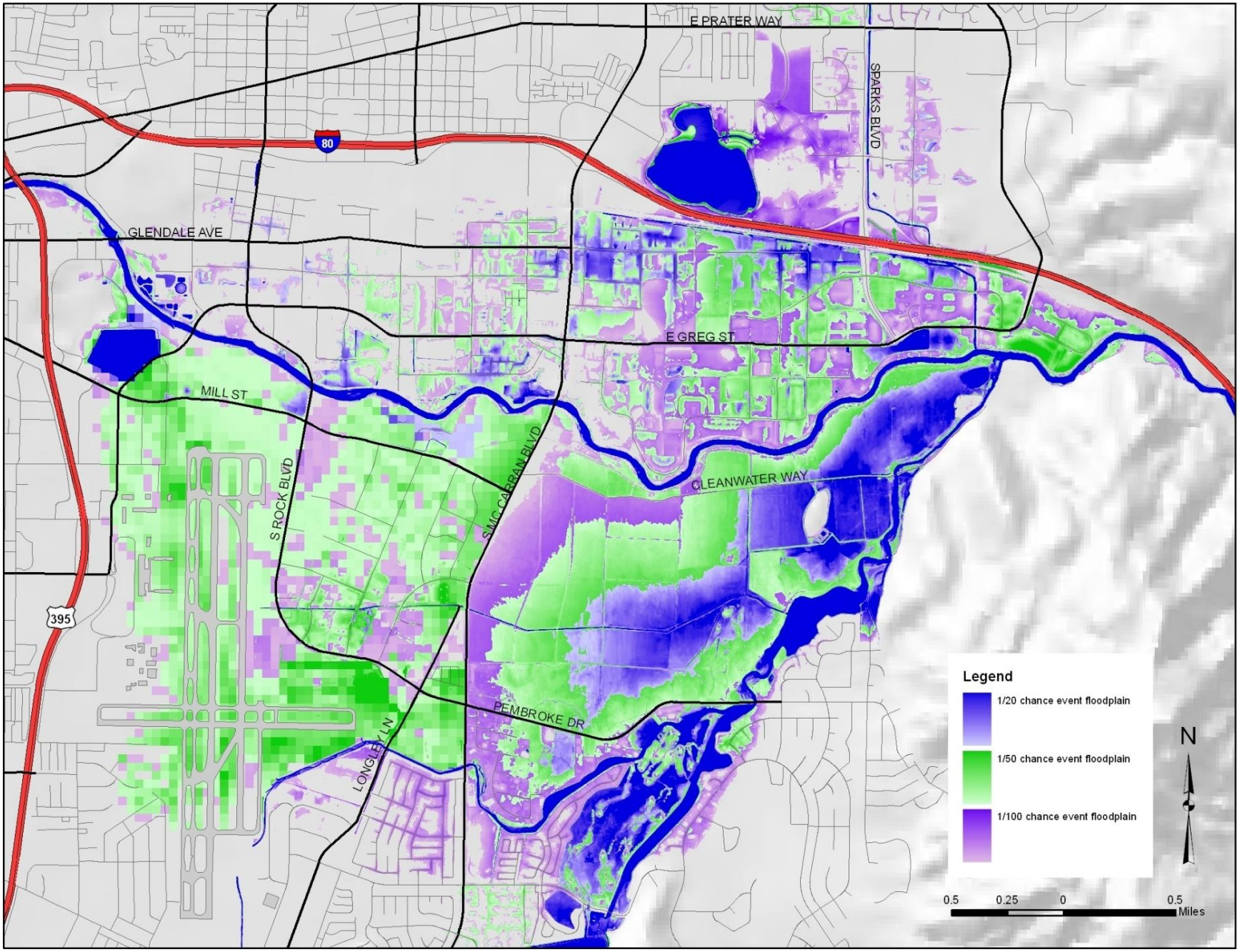


Figure 2-3. Truckee Meadows Existing Floodplains.

Lower Truckee River

Based on historic flows, USACE hydrologic analysis indicates that there is approximately a 1 in 15 (7 percent) chance of flooding in the Lower Truckee River. The current flood capacity of the lower Truckee River from Vista to Wadsworth is approximately 6,000 cfs. The existing floodplains conditions are shown on Figure 2-4 and Figure 2-5 for the 100-year event in the Lower Truckee River. As shown on this map, the 100-year event breaks out of the channel in Wadsworth and flows down an independent flow path parallel to the main channel. The breakout flows then recombine at a point about 6,000 feet downstream of the breakout. The results of the structural inventory indicate that few structures are located in the floodplains within the Lower Truckee River reach.

2.4.2 Barriers to Fish Passage

The Truckee River once provided connectivity between the saline waters of Pyramid Lake and ultra-oligotrophic waters of Lake Tahoe which once yielded Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) (LCT) greater than thirty pounds. As the cui-ui lake sucker (*Chasmistes cujus*)and LCT are both obligate freshwater spawners, they rely on sufficient inflow to allow them to run up the Truckee River to spawn, otherwise their eggs will not hatch.

Construction of more than 30 dams and water diversions over the 20th century has severely affected the movement of aquatic species throughout the Truckee River system. In particular, these structures act as complete or partial barriers to the upstream migration of the Federally threatened LCT and endangered cui-ui fish species to their historic spawning and rearing habitat. As a result, these native fish species are often forced to use sub-optimal habitats, reducing fish productivity and annual survivorship.

Three major structures impede fish movements between Pyramid Lake and Derby Diversion Dam: Marble Bluff Dam, 3 miles upstream; Numana Dam, 8.3 miles upstream; and Derby Diversion Dam itself, 34 miles upstream. There are also six small rock structures within the Pyramid Lake Paiute Tribal Reservation that impede passage. In addition, more than fourteen other diversion structures upstream of Derby Dam impede passage to cooler reaches and spawning tributaries nearer to the Sierra Nevada Mountains. The most significant of these are Pioneer, Glendale, Washoe/Highlands, Verdi, Steamboat, and Fliesh diversion dams.

In addition, diversion of over one-half of the annual flow of the Truckee River is the major contributing cause of the lowering of the water-surface elevation of Pyramid Lake by about 80 feet between 1895 and 1967 (Interior and State of California, 2008). Lake level fluctuations at the exposed delta at the river mouth have historically created channel instability and aquatic habitat degradation, including the blockage of endangered fish passage at the river's delta/lake interface to spawning grounds upstream.

Since the 1990's, there has been a strong local interest in restoring fish passage along the Truckee River. Fish passage improvement as an objective was considered during USACE's general reevaluation of the project and discussed in detail in the GRR. In 2012, the USACE and the Administration, in coordination with the non-Federal sponsor, decided to refocus plan selection on the primary project purpose of flood risk management (with recreation as a secondary purpose) to expedite completion of the study consistent with Administration and sponsor priorities. As a result, the action alternatives considered for recommendation are composed of flood risk management and recreation features in the Truckee Meadows area. As a companion document to the GRR, this EIS evaluates these same action alternatives so fish passage improvement as a possible project feature is not discussed further in the EIS.

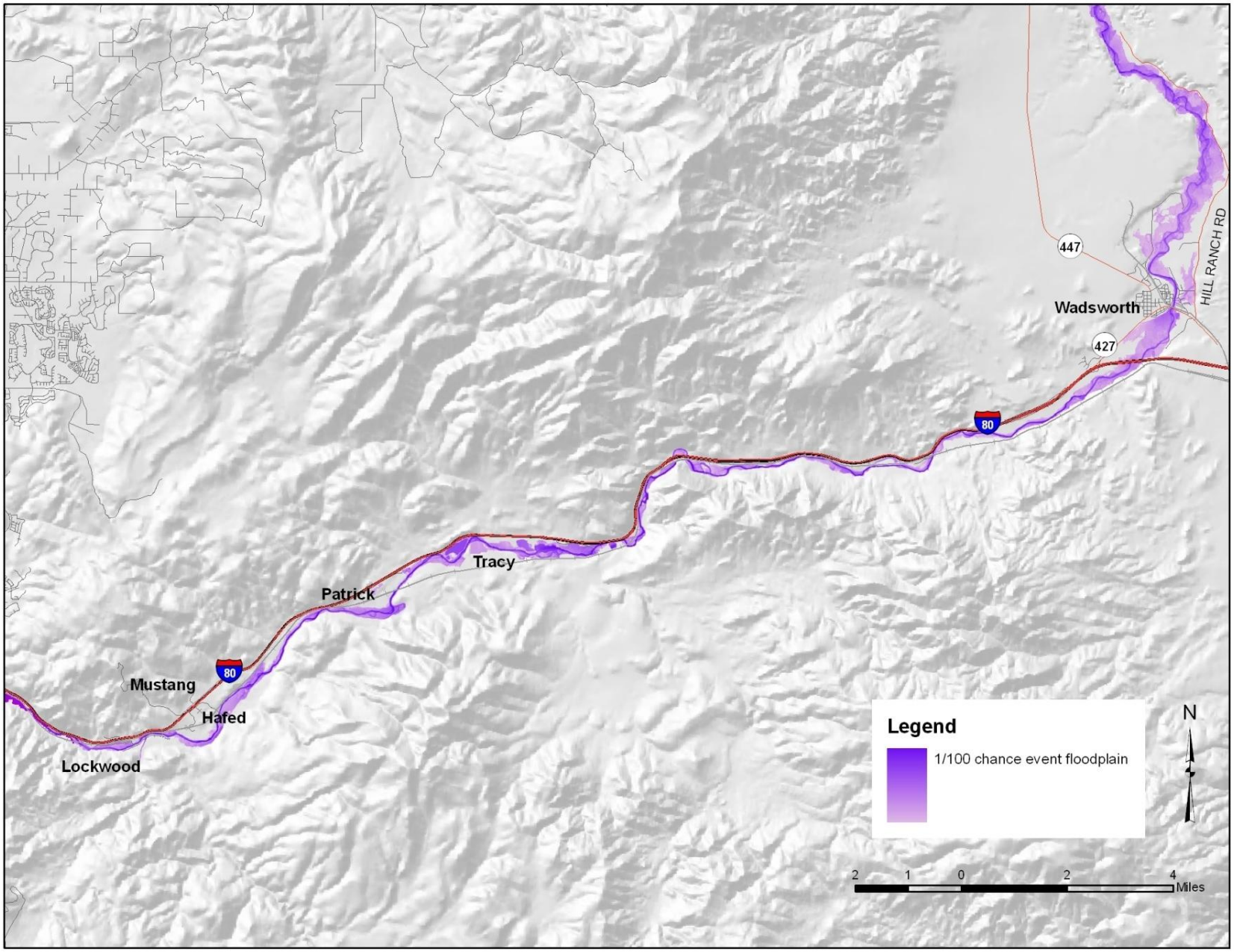


Figure 2-4. Lower Truckee River Existing Floodplains – Vista to Wadsworth.

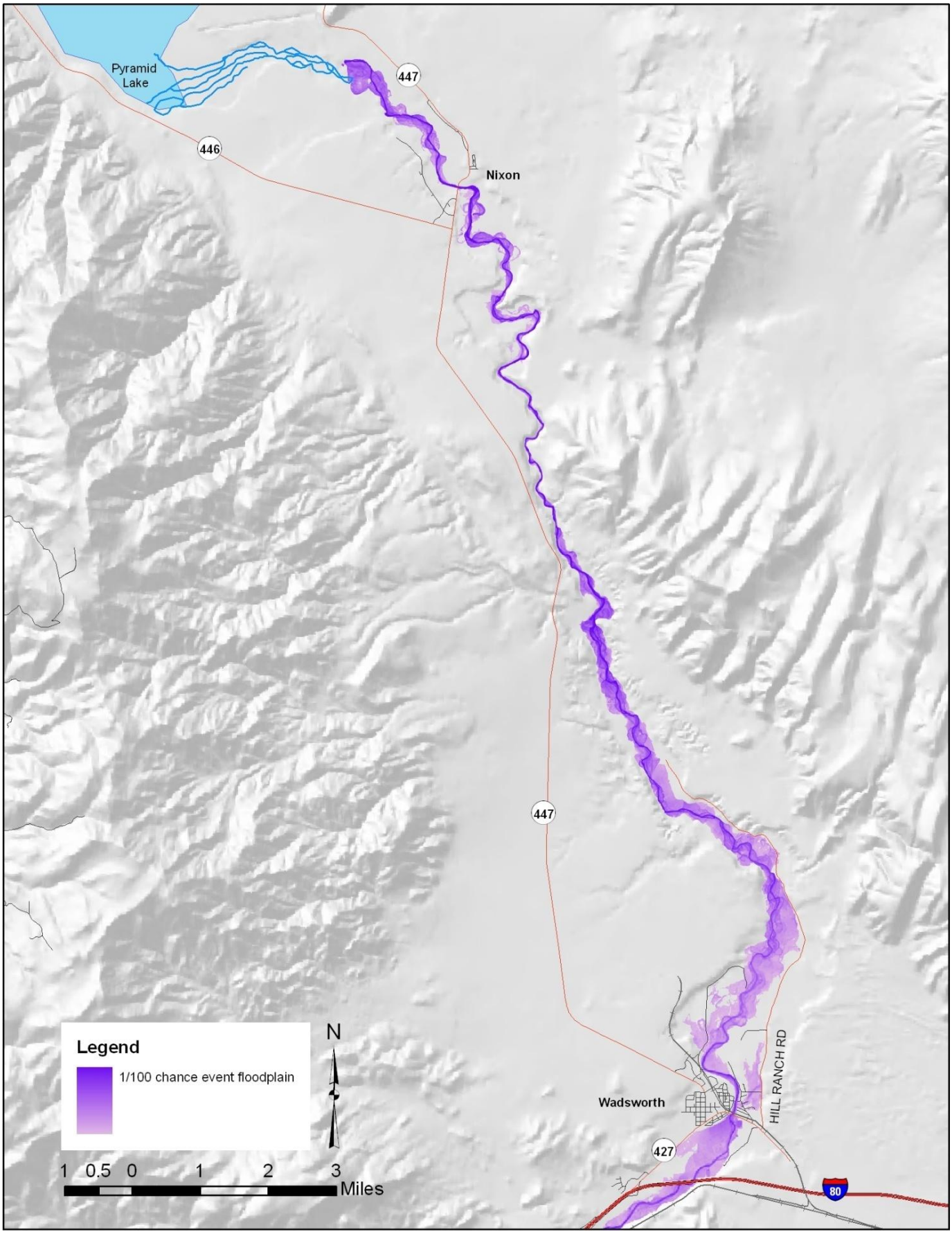


Figure 2-5. Lower Truckee River Existing Floodplains – Wadsworth to Pyramid Lake.

2.4.3 Recreation

Recreation opportunities have not kept pace with the increased demand stemming from a growing population in the Reno/Sparks area. The Truckee River is one of the most important water-oriented recreation resources in Washoe County and the only stream of its kind close to the Reno-Sparks market area. Local government agencies have long recognized the value of the river as part of their overall recreation planning. Recent recreation studies show both a current and future need for additional recreation facilities in the area.

Washoe County's Parks Inventory and Assessment, June 2007, indicates the growing demand for more recreation facilities in the region, including the project area. The County found that shifting patterns of residential growth, as well as average aging of the population over the next 20 years, would lead to demand for new recreation facilities and more passive recreation opportunities such as trails (Washoe County, 2007).

The City of Reno's Recreation Facilities Plan, 2008, discusses the condition of existing recreation facilities and identifies future recreation needs (over approximately 20 years) in order to maintain adequate levels of service for the projected population. According to the plan, the City will need to provide additional parks, ball fields, community centers, fishing access, bicycle trails, open space, and other facilities and opportunities (City of Reno, 2008).

Both the information provided in the County's 2007 Parks Inventory and Assessment and the City's 2008 Recreation Facilities Plan indicate that existing recreation facilities and opportunities both in the region and city are inadequate.

In addition, an insufficient number of outdoor recreation opportunities are located close to the population centers, where many lower-income and least formally educated citizens live. The 2010 Nevada Statewide Outdoor Recreation Plan indicates that lower income and lesser educated residents participate in outdoor recreation at lower rates than other groups. The America's Great Outdoors Initiative encourages recreation facilities to be located near populated areas to help serve these communities.

The project evaluates the potential for increasing recreational facilities and opportunities in the project area to help meet this need.

2.5 SIGNIFICANT ISSUES

Significant issues related to the Truckee Meadows Flood Control Project were identified during the scoping process. Comments were received during formal and informal agency and tribal meetings, workshops, public meetings, telephone interviews, and letters/emails. Many of the issues are related to either project design or potential adverse effects on environmental resources. A detailed discussion of the public involvement activities for this project is included in Chapter 12.

<u>Project Design</u>

- Ensure that the community is involved in formulation of alternatives.
- Consider changing operation of existing upstream water storage facilities, as well as constructing new storage facilities, to increase flood protection downstream.
- Explore other alternatives to the 1988 authorized project's proposed use of University of Nevada, Reno (UNR), property as a stormwater detention facility.

- Consider non-structural measures and alternatives such as raising structures or removing structures from the floodplain.
- Avoid or minimize induced flooding downstream due to construction of flood protection features in the Truckee Meadows.
- Use bio-engineered methods for bank stabilization rather than riprap.

Hazardous, Toxic, and Radiological Waste

- Prevent hazardous materials spills during construction, particularly near waterways.

River Geomorphology

- Maintain the Truckee River's natural processes when developing alternatives.
- Minimize any increases in streambed or bank erosion.

Water Resources and Quality

- Maintain existing water rights and water supply.
- Avoid degrading surface water and groundwater quality.
- Minimize any increases in sediment levels in the river.

Vegetation and Wildlife

- Minimize effects to terrestrial and aquatic habitat, particularly wetland and riparian habitat.
- Avoid effects to native wildlife species, particularly those that are protected by Federal, State, or agency laws or regulations.
- Provide for the movement and needs of resident wildlife. and avoid habitat fragmentation.
- Prevent the invasion and expansion of exotic weed species.

Fisheries

- Avoid effects to the Truckee River and Pyramid Lake fisheries.
- Improve fisheries populations and habitat by incorporating fish passage improvement measures at existing dams throughout the river system.

Land Use

- Consider the effects that existing land uses have had on the river's ecosystem.

Aesthetic Resources

- Avoid the use of high floodwalls and levees so that existing aesthetic values and viewsheds are not significantly affected.

Air Quality

- Minimize effects to air quality from particulate or dust emissions.

Noise

- Minimize effects of construction noise on the public and wildlife.

Socioeconomics

- Avoid any disproportionate adverse effects to low-income or minority communities.
- Maintain safety and security at the airport.

Cultural Resources

- Consider existing agency agreements pertaining to the historic Virginia Street Bridge.
- Avoid effects to cultural resources, both historic and pre-historic, in order to maintain the historic integrity of the area.

Indian Trust Assets

- Consult with tribes that could be affected by the project as directed by Executive Order 13175 and the 1994 Presidential Memorandum on Government-to-Government Relations with Native American Tribal Governments.

Cumulative Effects

- Consider cumulative effects of other past, present, and reasonably foreseeable future projects, including past USACE flood protection projects, when formulating alternatives and evaluating their effects.

CHAPTER 3. PROJECT AREA AND ALTERNATIVES FORMULATION

3.1 LOCATION OF PROJECT REACHES

Because of the diverse topography, land uses, and length of river miles, the project area along the Truckee River was divided into four reaches for plan formulation and environmental evaluation. These reaches are identified as Verdi, Downtown Reno, Truckee Meadows, and Lower Truckee River. As shown on Figure 3-1, the upstream Verdi reach extends from the Fleish diversion dam to Idlewild Park, while the Downtown Reno reach extends from Idlewild Park in Reno's central business district downstream to Highway 395. The Truckee Meadows reach encompasses a large area from Highway 395 on the west to Vista and the Virginia and Pah Rah Mountain Ranges on the east, south along Steamboat Creek to Huffaker Hills, and north to include Sparks. The Lower Truckee River reach extends from Vista downstream to the river's terminus at Pyramid Lake.

Early in the plan formulation process, USACE determined that the Downtown Reno reach was a "separable element", as far as flood risk management was concerned, from the Truckee Meadows and Lower Truckee River reaches. The term "separable element" means a portion of a project - (1) which is physically separable from other portions of the project; and (2) which - (A) achieves hydrologic effects, or (B) produces physical or economic benefits, which are separately identifiable from those produced by other portions of the project. 33 U.S.C. § 2213. In addition, flood damage reduction alternative solutions can be recommended and implemented without making existing flooding conditions any worse or better in the adjoining area. As a result, a flood risk management alternative developed for the Downtown Reno reach would not affect the adjoining Truckee Meadows reach.

3.2 PLAN FORMULATION PROCESS

Plan formulation is USACE' process of developing alternatives that meet national goals and planning objectives, while avoiding planning constraints. This iterative process involves repeating formulation, evaluation, and comparison steps many times to develop a reasonable range of alternatives and then narrow those plans to final feasible plans from which a single plan can be identified for implementation. Additional details of plan formulation are included in Chapter 4.0 of the GRR.

Because of the size and diversity of the project area, numerous stakeholders, and multi-purpose nature of the Truckee Meadows Flood Control Project, the plan formulation process was complicated and lengthy. The steps in the process for the project are summarized below:

- Identify and evaluate structural and nonstructural measures to achieve the planning objectives and avoid planning constraints. Measures are the "building blocks" of alternative plans.
- Identify a primary project purpose. For this study, flood risk management has been identified as the primary purpose because the original authorization was for flood control.
- Formulate, evaluate, and compare alternative plans to achieve the primary purpose (flood risk management), and identify a feasible plan that maximizes National Economic Development (NED) outputs. This plan is called the NED Plan.

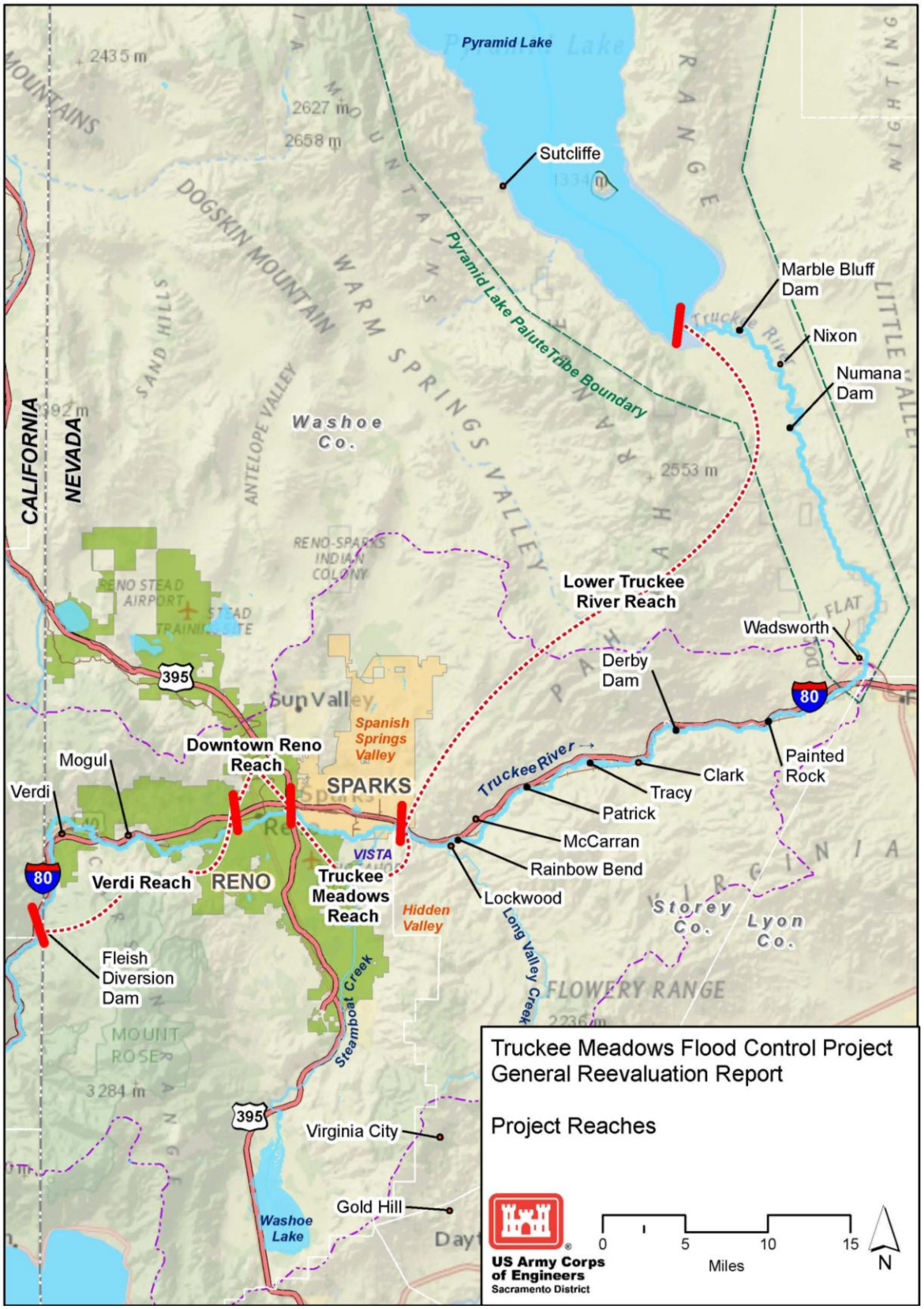


Figure 3-1. Project Reaches.

3.3 IDENTIFICATION AND EVALUATION OF MEASURES

Numerous measures were evaluated for their potential to contribute to alternative plans to reduce flood damages and improve recreational opportunities along the Truckee River in the project area. A total of 38 measures were carried forward for further consideration, including 26 flood risk management measures and 12 recreation measures. A list of the measures considered is presented in Table 3-1 for flood risk management measures and Table 3-2 for recreation measures. These measures are discussed in detail under "Management Measures" and "Screening of Measures" in Chapter 4 of the GRR.

3.4 DEVELOPMENT OF ALTERNATIVES

Development of alternatives involved combining the 38 measures into a range of alternatives that would meet the objectives of the study, while avoiding or minimizing significant adverse effects on environmental, social, and cultural resources. Following is a summary of the formulation process for the two objectives.

3.4.1 Flood Risk Management

Flood risk management was identified as the primary project purpose because the original authorization was for flood control. Based on guidance for formulation of multipurpose projects, single-purpose flood risk management alternatives were first formulated for the project area. Since the Downtown Reno reach was determined to be hydraulically independent from the Truckee Meadows reach, an array of single-purpose alternatives was developed and screened separately for each of the two reaches.

Table 3-3 displays the measures matrix for the preliminary flood risk management alternatives considered for Downtown Reno. Table 3-4 displays the measures matrix for the preliminary alternatives formulated for the Truckee Meadows reach. Once these alternatives were formulated, preliminary designs were developed for the purpose of developing cost estimates. These preliminary cost estimates would be used to screen for cost effectiveness. Formulation of these alternatives is discussed in detail under "Formulation of Preliminary Alternative Plans" in Chapter 4 of the GRR.

As explained in detail in Chapter 4 of the GRR, the preliminary flood risk management alternatives were screened against the four planning criteria of completeness, effectiveness, efficiency, and acceptability. For a plan to be carried forward, minimum standards set for the criteria had to be met. The No-Action alternative was not included in this screening process because it must be carried forward as the benchmark against which all retained alternatives are compared. Screening of alternatives for this project are summarized below.

Downtown Reno Reach

In the Downtown Reno reach, in the initial screening, the only alternative with net benefits was Alternative F - Bridge Replacement Only. This alternative was retained for further NED analysis, including a detailed cost estimate. A comparison of the new cost estimate with updated economic benefits showed that removing and replacing the Sierra, Virginia and Lake Street bridges was not cost-effective. Therefore, the project delivery team formulated a revised Bridge Replacement Only alternative in which the Sierra and Virginia Street bridges would be removed and replaced and the Lake Street Bridge would be removed, but not replaced.

Table 3-1. Summary of Flood Risk Management Measures Retained or Dropped

Measures	Effectiveness[1]	Efficiency[2]	Dropped	Retained
Flood Risk Management				
Non-Structural Measures				
Flood Insurance		In place	✓	
Early Flood Warning System		In place	✓	
Flood-proofing	Medium			✓
Flood Plain Evacuation	Medium	Inefficient	✓	
Dedication of Developed Floodplain to Natural Storage	Low	Inefficient	✓	
Dedication of Undeveloped Floodplain to Natural Storage	High			✓
Floodplain Management Plan	Medium			✓
Structural Measures				
Storage/Detention				
New Upstream Reservoirs		Inefficient	✓	
Upstream Detention with Weirs		Inefficient	✓	
On-stream Storage	Low		✓	
Upstream, Off-Channel Detention		Inefficient	✓	
Increasing Flood Control Storage at Upstream Reservoirs	Low		✓	
Tahoe Reoperation (precautionary release)	Low		✓	
Enclosed Detention Facility at University Farms	Medium			✓
Mustang Ranch detention facility				✓
Huffaker Hills detention facility				✓
Bypass Tunnel to Huffaker Hills Reservoir		Inefficient	✓	
Increase Channel Flow Capacity				
Channelization between Keystone and Arlington Avenues	Low		✓	
Channelization between Arlington Ave. and Virginia St.				✓
Channel Widening from Sierra Street to Lake Street				✓
Culvert Around Replaced Lake Street Bridge				✓
Plazas				✓
Containment at First Street	Low		✓	
Widening on the South Bank		Inefficient	✓	
Downtown Buyout		Inefficient	✓	
Channelization at Glendale Park Area	Low	Inefficient	✓	
Terracing Upstream of Steamboat Confluence				✓
Terracing Downstream of Steamboat Confluence				✓
Extension of Airport Culvert on Boynton Slough				✓
Channel Widening (excavation to channel bottom)		Inefficient	✓	
Channel Deepening at Vista Reefs		Inefficient	✓	

Measures	Effectiveness[1]	Efficiency[2]	Dropped	Retained
North Truckee Drain Realignment	High			✓
Reduce Flow Constrictions at Bridges				
Bridge Rehabilitation	Medium			✓
Bridge Preservation	Low		✓	
Replacement of Downtown Reno Bridges	Medium			✓
Mini Spans at Center and Sierra Street Bridges	Medium			✓
New Span at Virginia Street Bridge	Medium			✓
Wells Avenue Lower Bridge Removal				✓
Arlington Avenue Bridge Replacement	Low	Inefficient	✓	
Center Street Bridge Replacement		Inefficient	✓	
Culverts Around Existing Downtown Reno Bridges	Low	Inefficient	✓	
Virginia Street Bridge Bypass	Low	Inefficient	✓	
Culverts Around New Bridges (Sierra, Virginia, Lake, Center Streets)	Low		✓	
Bridge Lengthening at Rock and McCarran Boulevards	Medium			✓
Bypass Channel at McCarran Boulevard				✓
Floodwalls/Levees				
Floodwalls				✓
Setback Floodwalls				✓
Movable Barrier Floodwall System (MBFS)	Low		✓	
Modular Floodwalls		Inefficient	✓	
Tilt-up Floodwalls		Inefficient	✓	
Levees/Berms				✓
Setback Levees				✓
Modify Other Infrastructure				
Remove/Relocate Diversion Structures	Low		✓	
Reduce Width of Riverside Drive	Low			✓
Road Closure Bladders				✓

[1] Effectiveness is determined by how well a measure meets the planning objectives.
[2] Efficiency is determined by the potential benefits and costs of the measure.

Table 3-2. Summary of Recreation Measures Retained or Dropped

Measures	Effectiveness[1]	Efficiency[2]	Dropped	Retained
Trail-Based Amenities				
Create a Paved Maintenance Road/Bikeway	High			✓
Create Unpaved Trails	High			✓
Provide Trailhead Access and Amenities	Medium			✓
Construct Pedestrian Bridges	Medium			✓
Provide ADA compatible pathways	Medium			✓
Truckee Meadows Recreation Features				
Sports Courts	Low	Non policy compliant	✓	
Small and Large Open Fields	Medium			✓
League-Size Soccer Complex	Low	Non policy compliant	✓	
Diamond Sports Facility	Low	Non policy compliant	✓	
Small and Medium Soccer Fields	Low	Non policy compliant	✓	
Playground	High			✓
Picnic Sites & Shelters	High			✓
Fishing Access	High			✓
Non-Motorized Water Craft--Kayak & Canoe Access	High			✓
Natural Amphitheatre	Low	Non policy compliant	✓	

[1]Effectiveness is determined by how well a measure meets the planning objectives.
[2] Efficiency is determined by the potential benefits and costs of the measure.

Table 3-3. Management Measures Matrix for Preliminary Alternatives for Downtown Reno Reach

Measure	Alt A (Rehab)	Alt B (Matching)	Alt C (Landmark)	Alt D (Widening)	Alt E (New Span)	Alt F (Bridge Replacement)	Alt G (Nonstructural)
Increase Channel Flow Capacity							
Channelization between Arlington and Virginia St.	✓			✓	✓		
Channel widening from Sierra to Lake St.				✓	✓		
Culvert around replaced Lake St. Bridge				✓	✓		
Plazas					✓		
Reduce Constrictions At Bridges							
Replacement of Sierra St., Virginia St., Lake St. bridges		✓	✓	✓		✓	
Rehabilitate bridges at Sierra, Virginia, and Lake St.	✓				✓		
Mini spans at Center & Sierra St. Bridges				✓	✓		
Replace Bridges with Clear Span Bridges					✓		
New Span at Virginia Street Bridge					✓		
Wells Avenue Lower Bridge Removal	✓	✓	✓	✓			
Floodwalls, Levees							
Floodwalls	✓	✓	✓	✓	✓		
Levees	✓	✓	✓	✓	✓		
Modify Other Infrastructure							
Reduce width of Riverside Drive							
Install road closure bladders	✓	✓	✓	✓	✓		
Non-structural Measures							
Non-structural Commercial & Residential Flood-proofing	✓	✓	✓	✓	✓	✓	✓
Floodplain Evacuation							✓
Floodplain Management Plan	✓	✓	✓	✓	✓	✓	✓

Table 3-4. Management Measures Matrix for Preliminary Alternatives for Truckee Meadows Reach.

Measure	ALT 1 (Levees and Floodwalls Plan)	ALT 2 (Detention Plan)	ALT 3 (Floodplain Terrace Plan)
Storage/Detention			
Enclosed detention facility at University Farms		✓	
Dedication of Flood Plain for Natural Storage	✓	✓	✓
Huffaker Hills detention facility		✓	✓[1]
Mustang Ranch detention facility		✓	✓[1]
Increase Channel Flow Capacity			
Terracing upstream of Steamboat confluence			✓
Terracing downstream of Steamboat confluence			✓
Extension of Airport Culvert on Boynton Slough	✓		
Reduce Constrictions At Bridges			
Bypass Channel at McCarran Blvd.	✓	✓	✓
Bridge lengthening at Rock and McCarrran Blvds.	✓	✓	✓
Replace bridges at Boynton Slough and Longley Lane			✓
Replace culverts at Peckham Lane on Boynton Slough			✓
Levees and Floodwalls			✓
Floodwalls	✓	✓	✓
Setback floodwalls	✓	✓	✓
Levees	✓	✓	✓
Setback levees			✓
Modify Other Infrastructure			
Relocate N. Truckee Drain outlet	✓	✓	
Non-structural Measures			
Nonstructural Commercial and Residential Flood-proofing			✓
Floodplain Management Plan	✓	✓	✓

[1]Detention was initially part of plans but subsequently dropped due to high costs and failing to meet the objectives.

Benefits for this alternative were primarily from advanced bridge replacement cost savings. In general, advanced bridge replacement benefits are derived from extending the functional life of these bridges through replacement, providing benefits beyond flood damage reduction. However, continued economic analysis indicated that the revised Bridge Replacement Only alternative would not provide net benefits in excess of the costs. In addition, most of the benefits would be for transportation and are incidental to the project purpose of flood risk management. Consequently, there is no Federal interest in the revised Bridge Replacement Only alternative. Despite iterative efforts, no plan with a Federal interest has been identified for the Downtown Reno reach.

Truckee Meadows Reach

For the Truckee Meadows reach, three alternatives met USACE' planning criteria: Alternative 1 – Levees and Floodwalls Plan; Alternative 2–Detention Plan; and Alternative 3–Floodplain Terrace Plan. Each of these three alternatives also included features in the Lower Truckee reach to mitigate for induced flows caused by the work upstream. As explained in detail in Chapter 5 of the GRR, these alternatives were then evaluated to optimize performance using hydraulic flood risk management criteria. Optimization looked at each alternative with designs sized for three different flow frequencies, or potential flood events: the 2% (1/50), the 1% (1/100), and the 0.89% (1/117) annual exceedence probability (AEP). The list of optimization plans is summarized below:

- Alternative 1a (2% AEP)
- Alternative 1b (1% AEP)
- Alternative 1c (0.89% AEP)

- Alternative 2a (2% AEP)
- Alternative 2b (1% AEP)
- Alternative 2c (0.89% AEP)
- Alternative 3a (2% AEP)
- Alternative 3c (1% AEP)
- Alternative 3d (0.89% AEP)

National Economic Development Plan

The plan demonstrating the greatest gain in net benefits (flood damages prevented) when compared to plan costs moves forward for increased level of analysis and optimization to arrive at the NED Plan. The NED Plan is used for purposes of identifying the Federal Government's cost-sharing parameters for the project.

These three alternatives were evaluated at three levels of performance to economically optimize flood risk management. Preliminary benefits and costs for each level of performance were developed to identify the plan with the maximum net benefits. The cost estimates were preliminary in nature using conceptual designs, historic bid information, and professional judgment. These estimates were only used for screening. Ranking of the alternatives based on preliminary net benefits is shown in Table 3-5 (1 = highest rank). (Only the relative ranking of alternatives is shown here because significant inaccuracies were later found in the preliminary benefits.)

Initial results indicated Alternative 3d was tentatively identified as the optimized design of Alternative 3. However, recent changes in real estate values in the project area, as well as refinements and corrections to the hydraulic and economic models being used, required a review of the initial optimization results. Corrections to the economic analysis resulted in a substantial reduction in the benefits for all levels of performance, but particularly the Alternative 3d. This invalidated the previous tentative identification of the Alternative 3d as the optimal plan. Adjustments to the hydraulic and economic models affected all other alternatives in a relatively consistent manner so that the previous ranking of alternatives beginning with the second ranked plan would not change; therefore, Alternative 3a became the optimal plan. Because adjustements to the hydraulic and economic models affected all other alternatives in a relatively consistent manner, Alternatives 1 and 2 were not re-evaluated as a result of the model adjustments.

Table 3-5. Initial Comparison of Flood Risk Management Plans

Alternative (nominal level of performance[1])	Preliminary Costs[2]	Rank Based on Preliminary Net Benefits
No-Action	0	8
Alternative 1a (50)	$321.3	4
Alternative 1b (100)	$513.3	7
Alternative 1c (117)	$555.0	6
Alternative 2a (50)	$315.9	5
Alternative 2b (100)	$598.1	10
Alternative 2c (117)	$614.1	9
Alternative 3a (50)	$325.4	2
Alternative 3c (100)	$482.8	3
Alternative 3d (117)	$448.3	1

[1] Nominal level of performance = 90% assurance of safely containing indicated event water surface elevation behind the lines of protection. For example, alternative 1a would safely contain the 2% (1/50) ACE water surface elevation 90% of the time.
[2] October 2007 prices.

Table 3-5 shows that all Alternative 3—Floodplain Terrace Plan designs outperformed the other alternatives, so the Floodplain Terrace Plan was carried forward for more detailed analysis and optimization. Additional details are included in Sections 5.3-5.8 in Chapter 5 of the GRR.

The alternatives were also compared with other considerations not specifically addressed in the NED evaluation, identified in the Federal Government's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G) as the system of accounts, including Environmental Quality (EQ), Regional Economic Development (RED), and Other Social Effects (OSE). Evaluation of the EQ account allows for consideration of the non-monetary effects the alternative plans may have on significant environmental resources. Also considered are the possible effects that the proposed plans may have on regional economic activity, specifically income and regional employment, under the RED account. Lastly, a comparison of the effects the alternatives may have on public facilities and services, recreational opportunities, transportation and traffic and man-made and natural resources are also considered under the OSE account. A discussion of the system of accounts comparison between alternative plans is included in Chapter 5 of the GRR.

Based on the comparison of the other system accounts, Alternative 1-Levees and Floodwalls Plan represented a much greater adverse affect to significant environmental resources in the project area than Alternative 3. Construction of approximately 10-foot-high earthen levees and concrete or cinder block floodwalls on the banks immediately adjacent to the Truckee River, as well as along tributary streams and canals, would involve permanent removal of high value riparian habitat and significant adverse effects on aquatic habitat. Construction would also permanently change the regionally important Truckee River viewshed from pleasing riparian/riverine views to abrupt high levees or floodwalls. Both environmental groups and residents in the Reno area expressed substantial opposition to this alternative during public and agency meetings and workshops. All other differences among the alternatives are insufficient to outweigh the higher relative ranking of Alternative 3 based on net NED benefits.

Finally, identification of the NED required further incremental reformulation of Alternative 3 because the economic and hydraulic modeling errors invalidated the initial identification of Alternative 3d as the optimal plan. This reformulation process involved using existing cost data to first identify the economic damage areas in the Truckee Meadows reach that provided the greatest potential for benefits. Then USACE used estimated costs and benefits to assess the various elements of Alternative 3 for increments that could be implemented that would have a beneficial effect, starting with the two highest priority economic damage areas. As further discussed in Chapter 5 in the GRR, this process reaffirmed the 2% AEP as the reasonably optimized scale of design for Alternative 3 and the incremental reformulation of plan features identified a plan that reasonably maximized net economic benefits, confirming Alternative 3—Floodplain Terrace Plan as the NED Plan. The final NED Plan features in the Truckee Meadows reach include: floodplain terraces; levess and floodwalls; improvements to the North Truckee Drain and People's Drain; interior drainage facilities; seepage remdediation; and channel bank and bridge pier/abutment scour protection.

During refinement of the preliminary hydraulic design, adjustments to the design were also made where the project performance could be substantially improved at minimum additional cost. This resulted in an AEP near 1% for the main economic impact areas of concern. The estimated project performance varies by Economic Impact Area (EIA). Chapter 5 of the GRR provides more discussion of project performance by EIA.

Induced Flooding Resulting from NED Plan

Hydraulic modeling of the NED Plan found that the 1% ACE flood elevations would increase between 0.0 and 0.6 feet in several areas near the downstream end of the project compared to the without-project condition. (There is some level of uncertainly in any hydraulic model; in this case, based on professional judgment, this uncertainty could increase or reduce the estimated water surface elevations by 0.5 foot.)

- UNR Farms and southern periphery (Steamboat South and Hidden Valley EIA's): The flood elevation increase at in the UNR Farms area is up to 0.6 footeet. The USACE-estimated with-project 1% ACE flood elevations would exceed the first floor elevations of an estimated 900 existing structures (mostly single-family residences and multiplex apartment buildings) on the southern periphery of the UNR Farms area that are also within the USACE without-project 1% ACE floodplain. An estimated additional 175 residences that are outside of the USACE without-project 1% ACE floodplain would be within the limits of the with-project floodplain, but it is estimated that their first floors would still be above the with-project flood elevation. The estimated increase in the 2% ACE flood elevations would affect about 22 existing structures south of UNR Farms (Steamboat South and Hidden Valley EIA's), most of which would have an estimated increase of 0.2 to 0.4 foot.

- North Truckee Drain (NTD): The 1% ACE flood elevation on both sides of the NTD immediately north of I-80 would be increased by approximately 0.5 to 1 foot due to backwater effects in the NTD.

The average annual induced damages are estimated to be $90,000. Figure 3-2 shows the areas in the estimated without- and with-project 1% ACE floodplains based on USACE hydrology. The area shown in blue is the without-project 1% ACE floodplain and the area in green is the with-project 1% ACE floodplain. The areas shown in yellow are areas that are now in the 1% ACE (with-project) floodplain that were not in the without-project floodplain – these are areas that now are anticipated to flood from the 1% ACE event. The crosshatched area is the existing FEMA base flood area. The FEMA map is included here to illustrate the difference between the FEMA and USACE floodplains, as it is expected that FEMA will adopt USACE hydrology when the maps are updated.

Additional information regarding the increased flood elevation is included in the GRR's Economic Appendix and Attachment B to the GRR's Engineering Appendix.

Consideration of Mitigation for Induced Flooding from NED Plan

USACE policy allows mitigation for induced flooding to be recommended as a project feature when it is economically justified or there are overriding reasons of safety, economic or social concerns, or a determination of a real estate taking has been made (ER 1105-2-100, para.3-3.b.(5)). Potential mitigation measures for induced flooding were considered by USACE, but none were found to be economically justified. The structural and non-structural measures considered for the south side of the Truckee River were as follows: raising or wet floodproofing existing residential and commercial structures,; levees and floodwalls to protect existing structures; a detention basin with perimeter levees in the UNR Farms area; excavation of the hydraulic constriction downstream of Truckee Meadows including downstream hydraulic and environmental mitigation; and purchase/ removal of the affected structures. The structural and non-structural measures considered for the north side of the Truckee River were as follows: a pump station; ring levees; and raising/wet flood-proofing existing residential and commercial structures. Raising/flood-proofing structures on the south side and a pump station on the north side were found, by USACE civil and cost engineering staff using their professional experience, to be the least costly options based on rough cost estimates for each measure. The average annual flood risk management benefits for those measures were found to be far less than required to justify their costs. Any increase in flooding will be an important concern for adversely affected property owners. However, because of the small increase in flood elevations and the low recurrence frequency of induced flooding, those concerns are not considered to be overriding safety, economic, or social concerns under USACE policy, and no real estate taking would occur. Therefore, mitigation for induced flooding is not proposed as a project feature of the Federally funded NED Plan.

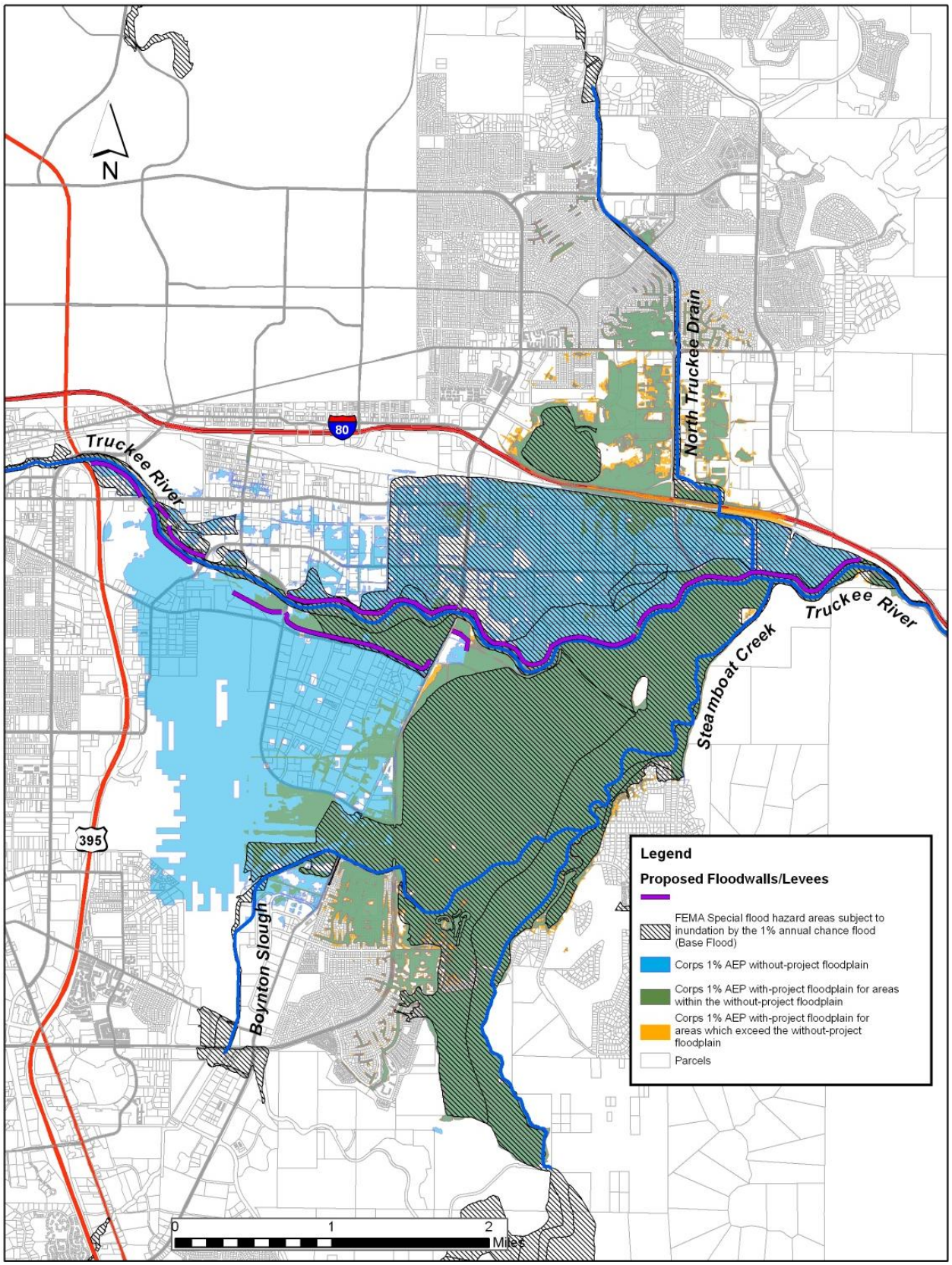


Figure 3-2. Alternative 3-Floodplain Terrace Plan With- and Without-Project 1/100 ACE Floodplains.

National Flood Insurance Program Compliance

The increased 1 percent flood elevations caused by the NED Plan would trigger an NFIP regulatory requirement (44 C.F.R. § 60.3(d)) that communities must seek conditional approval from FEMA before allowing certain encroachments upon a floodplain. Applications for such conditional approvals must certify, among other things, that no structures are located in areas that would be impacted by increased base flood elevations (44 C.F.R. § 65.12(a)(5)). Under USACE policy, compliance with the NFIP is a non-Federal responsibility and compliance costs would be borne by non-Federal interests. Additional costs of NFIP compliance that would result from USACE project are identified as associated costs of the project and are included in the financial and economic costs of the project.

The associated economic cost for NFIP compliance is the estimated minimum cost for the non-Federal interests to comply with the NFIP if the NED Plan is implemented. Participation in and compliance with applicable Federal floodplain management and flood insurance programs is a requirement of non-Federal sponsor (in this case TRFMA) participation in Federal flood control projects under Section 402 of WRDA 1986, as amended. The NFIP compliance costs are not based on specific features proposed by TRFMA. The estimated NFIP compliance costs are based on the least-cost features that could be added to the NED Plan by local interests to achieve NFIP compliance, without modifying the NED Plan. NFIP compliance costs have been included in the associated economic costs pursuant to the joint FEMA-USACE memorandum dated June 2012. Incidental flood damage reduction benefits resulting from NFIP compliance have been included in the economic analysis of the NED.

USACE used the information developed for the analysis of potential mitigation measures discussed under *"Consideration of Mitigation for Induced Flooding From NED Plan"* to consider several options for NFIP compliance. Based on preliminary estimates and professional judgement, it was determined that non-structural methods including house raising would likely be the least-cost option on the south side of the Truckee River. Through coordination with regional FEMA staff, it was verified that raising the first floors of affected residences above the new base flood elevation would comply with the NFIP regulation. Approximately 764 homes and 128 multiplex apartment buildings would need to be raised in the area south of the river. Additionally, four commercial structures and three public buildings would also need to be raised or "wet flood-proofed" with closures and sealing. Figure 3-3 identifies the land parcels with structures that are estimated to require raising or flood-proofing. The preliminary cost estimate to raise and flood-proof structures for NFIP compliance on the south side of the Truckee River is $172 million.

For the north side of the Truckee River, a 400-cfs capacity pump station on the North Truckee Drain with an outfall to the Truckee River would be the least-cost option. The estimated first cost for the pump station is $23 million. Therefore, the total estimated minimum non-Federal costs cost for NFIP compliance is $195 million.

Because compliance with the NFIP is a non-Federal responsibility, the affected NFIP communities could develop their own plan for compliance with the NFIP and would not be required to implement the specific assumed least-cost features. The estimated NFIP compliance costs are subject to change based on more detailed hydraulic analysis during final design of the project, including the results of NFIP hydraulic modeling assumptions and methods, and more detailed surveys of the elevations of existing structures.

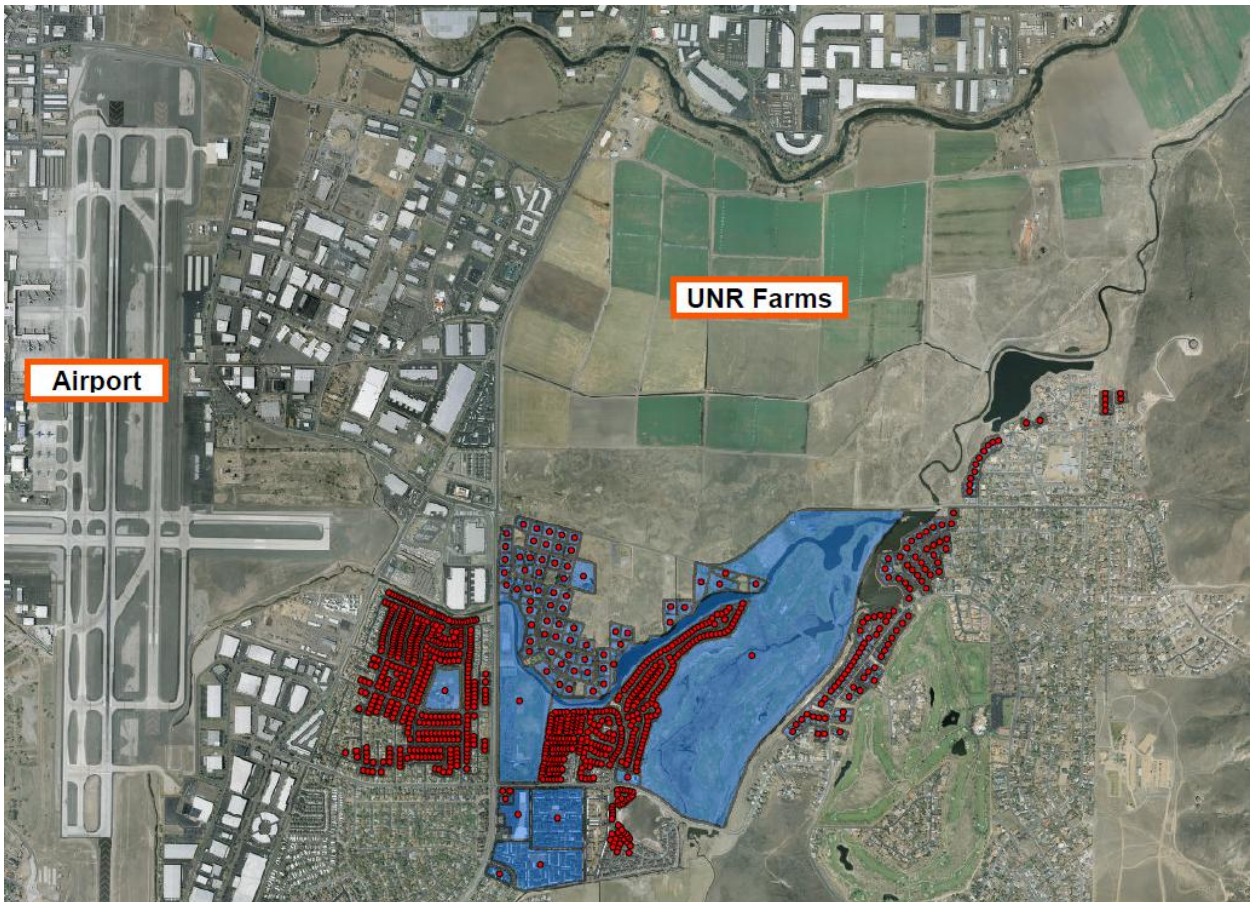


Figure 3-3. Parcels with Structures Requiring Raising/Flood-proofing for NFIP Compliance

Locally Developed Plan

In 2008 TRFMA requested that USACE include a fourth alternative for consideration that more closely aligned with the Community Coalition's "living river" concept and met their local objective of flood risk reduction at the 1% chance event in the Downtown Reno reach and the 0.89% chance event (equivalent to flows experienced in the 1997 flood event) in the Truckee Meadows reach. As a result, USACE included Alternative 4–Locally Developed Plan, a variation of Alternative 3d, among the alternatives for consideration. In the Downtown Reno reach, the locally developed plan proposed the replacement or removal of five downtown bridges presenting the greatest obstructions to flow. In addition, the plan included construction of floodwalls and levees, flood-proofing, bed, bank, and pier scour protection, interior drainage management features, and temporary closures structures from just upstream of Booth Street to Highway 395. In general, in the Truckee Meadows reach the locally developed plan flood risk management features were the same as Alternative 3—Floodplain Terrace Plan, but sized to contain flood flows of a 0.89% ACE. In addition, the plan included lengthening the McCarran Boulevard and Rock Boulevard bridges, a bypass channel around the Sagewinds/ Bristlecone property, floodproofing at the Hidden Valley and East Side subdivisions, a ring levee around the UNR Farms Main Experiment Station, and realignment of the North Truckee Drain. As a result of this alternative, significant increases in downstream flows (approximately 3,300 cfs at the 1% chance event) would have required hydraulic mitigation in the form of bed, bank, and pier scour protection, floodwalls at Lockwood/Rainbow Bend, replacement of Painted Rock Bridge, floodwalls at Wadsworth, and additional bank terracing downstream of Lockwood Bridge.

3.4.2 Recreation

Following identification of the NED, a recreation plan was formulated that incorporated recreation features into the proposed flood risk management alternatives. Selection of recreation features was based on local sponsor interest, features allowed under USACE recreation policy, and evaluation of recreation demand and community willingness to pay. A detailed description of the analysis can be found in Chapter 5 of the GRR, and summarized below.

The strategy used to formulate recreation alternatives was to start with a relatively few basic recreation measures and add more optional features (playground and group picnic shelters) as additional increments. The measures were evaluated against their ability to meet the planning objective and the four P&G screening criteria, particularly effectiveness.

Three scales of recreation features were evaluated for the NED Plan for flood risk management. Alternative A includes:

- Fifty individual picnic areas
- Four kayak and canoe input areas
- Thirteen fishing areas
- 9,700 linear feet of paved trails
- 8,900 linear feet of unpaved trails

Trailheads were included in paved or unpaved trail features. Fishing access, non-motorized boat access and kayaking access costs were combined with the cost of trails leading to them since benefits cannot be derived from these activities unless access is provided by trails. Plan B adds the following measures to Plan A:

- Playground
- Small group picnic shelter

Plan C includes the measures in Plan A and Plan B plus the following measure:

- Medium group picnic shelter

Costs and benefits were developed for each of the three plans. Point values were assigned based on an evaluation of existing recreation features within the project area using the point scale provided in Engineer Guidance Memorandum (EGM) 12-03. Criteria measured included recreation experience, availability of opportunity, carrying capacity, accessibility, and environmental condition. Scoring was the result of informed opinion and professional judgment.

Recreation demand was determined based on the 2008 recreation demand survey conducted by Responsive Management of Harrisonburg, Virginia. Recreation demand for unpaved trails was calculated on the activities of running, walking and jogging. The survey identified mountain biking as another activity that could make use of unpaved trails, however, for an urban setting this demand is considered to remain unmet by the project. The general recreation value for each plan was multiplied by the average annual users to determine a total annual recreation value for each plan.

Each recreation plan had a preliminary cost estimate developed. A preliminary estimate of the interest during construction and the routine OMRR&R costs was developed to calculate the average annual cost for each plan. Plan C had the greatest net recreation benefits as well as a benefit-to-cost ratio of 2.1:1 Therefore, Plan C was identified as the NED recreation plan, as discussed in more detail in Chapter 5 of the GRR.

Based on the analysis, the following features were incorporated into the NED alternative designs in the Truckee Meadows Reach:

Proposed recreation features in the Truckee Meadows reach for this alternative include the construction or installation of:

- Four canoe/kayak launch points at Fisherman's Park, Glendale Park, Cottonwood Park, and the trail access at the end of Sparks Boulevard;
- Thirty-two new picnic locations on the north and south sides of the river, including 16 within the recreation focus area of the proposed plan between Rock Boulevard and McCarran Boulevard;
- Thirteen fishing access locations on the north and south sides of the river, from Highway 395 to Cottonwood Park;
- 18,600 linear feet of new paved and unpaved recreation trails;
- Community park at the current location of the Excel Building, which would include a parking lot, playground, public restroom, medium-sized picnic shelter, and access to new walking and nature trails; and
- Small-sized picnic shelter at the current Sagewinds property.

The proposed recreation plan layout is included in Appendix A.

These same recreation features would have been incorporated into all alternatives considered and located based on the alignment of the flood risk management features; however, in order to maximize efficiency of analysis effort, a detailed layout was developed only for the Floodplain Terrace alternative with the assumption that recreation feature placement would not vary greatly for the other alternatives.

3.4.3 Identification of the Recommended Plan

The Recommended Plan for the Truckee Meadows GRR consists of:

- No action in the Downtown Reno Reach
- Flood risk management in the Truckee Meadows Reach, consisting of the NED Plan (FRM Alternative 3 - Floodplain Terrace
- NED Plan for recreation in the Truckee Meadows Reach (Recreation Alternative C)

3.5 FINAL ALTERNATIVES

Based on the results of the economic analysis, the identified flood risk management and recreation plans were combined to form the final array of alternatives to be considered further.

The Recommended Plan is the NED Plan for flood risk management and recreation, Alternative 3-Floodplain Terrace Plan . As indicated in Appendix G of the USACE Planning Guidance Notebook

(ER 1105-2-100), a comparison of the recommended plan to the authorized plan is called for when changes to a Congressionally authorized plan are being proposed. This includes an evaluation of environmental effects. Given the time that has elapsed since completion of the authorized plan's EIS (1985) and changes that have occurred in the project area since then, a detailed analysis of Alternative 2-Detention Plan , a plan similar to the authorized plan, is included in this EIS in order to establish relevant environmental effects for comparison to the recommended plan. A No Action Alternative is also included as required by NEPA. A detailed description of these final alternatives is provided in Chapter 4 and summarized below.

3.5.1 No Action (Future Without-Project) Alternative

Under the No Action Alternative, USACE would not participate in any project to reduce the risk of flooding and flood damages and increase recreational facilities in the project area. This alternative assumes future without-project conditions and serves as the benchmark against which the environmental effects of the action alternatives are evaluated in the EIS.

3.5.2 Alternative 3-Floodplain Terrace Plan

The main features of the Floodplain Terrace Plan include setback levees and floodwalls, floodplain terracing, and associated recreation in the Truckee Meadows reach. The Truckee Meadows reach would also include hydraulic mitigation features to address changes in river hydraulics induced by project features.

3.5.3 Alternative 2-Detention Plan

The main features of the Detention Plan include setback levees and floodwalls, detention facilities at UNR Farms and Huffaker Hills, and associated recreation in the Truckee Meadows reach. The Truckee Meadows reach would also include hydraulic mitigation features to address changes in river hydraulics induced by project features.

3.5.4 Alternatives not Considered Further

NEPA requires that an EIS consider a range of reasonable alternatives that could accomplish the project's purpose and need, as well as a no action alternative for comparison. Reasonable alternatives are considered by the Council on Environmental Quality to be those that are practical or feasible from the technical and economic standpoint and based on common sense. . Pursuant to 40 C.F.R. § 1502.14(a), alternatives determined to be infeasible do not need to be considered in an EIS, but the reasons why they were eliminated from detailed discussion must be briefly discussed in the EIS. For the Truckee Meadows Flood Control Project EIS, the Levees and Floodwalls Plan and the Locally Developed Plan were considered to be infeasible as discussed below.

<u>Alternative 1-Levees and Floodwalls Plan</u>

As designed, the Levees and Floodwalls Plan included construction of approximately 10-foot-high earthen levees and concrete or cinder block floodwalls on the banks immediately adjacent to the Truckee River, as well as along tributary streams and canals, in the Truckee Meadows reach. Riparian and aquatic resources are of extremely high value in this arid state, and construction would involve permanent removal of 21 acres of riparian habitat and significant adverse effects on aquatic habitat. Construction would also permanently change the regionally important Truckee River viewshed from pleasing riparian/riverine views to abrupt high levees or floodwalls. Both environmental groups and residents in the Reno/Sparks area expressed substantial opposition to this alternative during public and agency meetings and workshops. In addition, TRFMA indicated an unwillingness to participate in this

alternative because of its higher costs (approximately $513 million) as compared to the Floodplain Terrace Plan. Because of the significant environmental effects, substantial public opposition, and lack of partner support to participate on a higher cost project that lacked community support, the Levees and Floodwalls Plan was considered to be infeasible and was not considered further in the EIS.

Locally Developed Plan

Although the locally developed plan would have provided a greater level of flood risk reduction in the Truckee Meadows reach as well as provided a greater reduction in flood risk in the Downtown Reno reach, the cost of this plan was more than four times the cost of the Floodplain Terrace Plan and the economic benefits from flooding it would prevent did not present a substantial incremental increase for that cost. In order for USACE to recommend a plan for implementation, the plan must demonstrate at least an economic benefit at least equal to its cost. In the case of the locally developed plan, the costs far exceeded the benefits provided, conservatively estimated at less than 0.8 to 1 return on total investment. In addition, the locally developed plan would have induced the highest increase in downstream flows of all alternatives considered, requiring the greatest amount of hydraulic mitigation to address effects these increased flows would have on scour potential and flooding in the Lower Truckee River reach. Implementation of the larger hydraulic mitigation footprint would also lead to greater effects to riparian and aquatic habitat, as well as fisheries resources, including those of the threatened LCT and endangered cui-ui. Because of the substantial cost, significant environmental effects, and greater flooding effects to downstream communities, this alternative was not considered further in the EIS.

In an effort to identify a plan that would meet their “100-year level of flood protection” objective and demonstrate an increase in net economic benefits, TRFMA is pursuing revisions to their locally developed plan. A review of their proposed revised plan indicates that they are considering similar features to the Recommended Plan, employing levees, channels, floodwalls, and floodplain terracing to convey flows. TRFMA’s revised locally developed plan appears very similar to Alternative 3c, discussed in section 3.4. Like Alternative 3c, TRFMA’s revised plan includes increasing conveyance capacity through the Vista Narrows. The main differences between TRFMA’s revised plan and Alternative 3c are the realignment of the North Truckee Drain and mitigation proposed for downstream hydraulic impacts. According to TRFMA’s hydraulic modeling outputs, their revised plan would increase peak downstream flows to 3,600 cfs for the “100-year” design flood event. Because of the increased downstream flows, their revised plan includes elevating 37 to 47 structures in Rainbow Bend and the Wadsworth vicinity, as well as acquiring flowage easements in the Lower Truckee River reach, as mitigation measures. TRFMA’s revised plan does not include downstream bank stabilization as part of the initial construction, as anticipated by USACE for mitigation from a similar increase in peak flows, but does include acquiring access easements for potential future scour remediation. The revised plan also includes 0.8 acre of terracing on the west bank of Steamboat Creek to remove a flow constriction. The North Truckee Drain realignment is similar to the realignment considered as part of Alternative 2 in this EIS.

Based on USACE’s review, TRFMA’s revised locally developed plan is not a substantially different alternative than those already considered in this EIS. In general, TRFMA’s revised plan is a larger scale plan than the Recommended Plan, but is within the range of alternatives considered by USACE as part of its economic and environmental evaluations. The main differences between the TRFMA plan and USACE alternatives involve design details, ancillary features (e.g., North Truckee Drain and Steamboat Creek bank terrace), and mitigation measures for hydraulic and habitat impacts, rather than the primary features considered to address the project purpose and need. Based on this review of TRFMA’s revised plan, the constraints from the previous locally developed plan still exist; therefore, this plan is not considered further in the EIS.

CHAPTER 4. ALTERNATIVES

4.1 THE NO ACTION (FUTURE WITHOUT-PROJECT) ALTERNATIVE

Under future without-project conditions, it is assumed for planning purposes that no major Federal action would be taken to alleviate flood or ecosystem problems in the study area, except for the implementation of the Truckee River Operating Agreement (TROA) approved in 2008. Implimentation of TROA would increase the operational flexibility and efficiency of reservoirs in the Lake Tahoe and Truckee River basins. TROA changes the operation of Federal reservoirs and Nevada Energy's (NV Energy) (formerly Sierra Pacific Power Company) exercise of its Truckee River water rights to (1) improve spawning conditions for the Pyramid Lake fishes and (2) provide additional municipal and industrial water for the Truckee Meadows during drought situations. The assumed without-project condition is the benchmark against which plans are evaluated. Except for specific approved Federal actions that are likely to be funded and implemented without a USACE project, it would be speculative and inappropriate to assume that other potential future Federal actions will address the same problems that this study is intended to address. These forecasts are from the base year (year when a project is assumed to be operational) to the end of the period of analysis (50 years).

4.1.1 Physical Setting

Verdi Reach

No specific physical changes are anticipated in the Verdi Reach without a Federal project being implemented. Maintenance activities on the Martis Creek Dam Project features in this reach would continue.

Downtown Reno Reach

The existing floodwalls and levees will continue to serve as flood control features for the Downtown Reno Reach, if properly maintained. The Sierra, Virginia, Center and Lake Street bridges will continue to be a constraint on water passage on the Truckee River through downtown Reno. Maintenance activities on the Martis Creek Dam Project features in this reach would continue.

Truckee Meadows Reach

Though the Reno Flood Warning System will continue to function and provide Reno and Sparks with advanced warning of flood events, the Reno-Sparks area will remain at risk from flooding without a Federal project. Flood plain management, flood warning systems, and emergency preparedness are expected to continue in the region.

A regional water management plan will remain in place that addresses groundwater and surface water quality, water supply, flood and water drainage management, and other plan requirements. Maintenance activities on the Truckee River and Tributaries Flood Control Project features in this reach would continue.

Lower Truckee River Reach

The community of Rainbow Bend at Lockwood would likely remain the same size since developable land adjacent to the community is scarce. Rainbow Bend would remain at risk from flooding from Long Valley Creek, a tributary to the Truckee River. Maintenance activities on the Truckee River and Tributaries Flood Control Project features in this reach would continue.

4.1.2 Socioeconomic Conditions

Verdi Reach

Based on the City of Reno's Master Plan (2007) and Washoe County's Master Plan (2010), there likely would be additional development in this reach in the future; however there are no specific plans currently identified for areas outside of existing development. Developable areas lie outside the floodplain high on hills and terraces.

Downtown Reno Reach

Forecasts for future without-project conditions indicate that Reno and Sparks will continue to grow at a rate of about 1.4 percent per year. It is assumed that additional redevelopment of the downtown Reno area will continue and that development will include flood proofing from the 1% ACE event (also referred to as 1:100, 1/100, or "100-year event"). By the year 2030, the city of Reno population is expected to increase to approximately 339,500 (City of Reno, 2007).

Truckee Meadows Reach

Based on a projected population of 590,490 for Washoe County in the year 2030, the average annual growth rate is 1.32 percent (Washoe County, 2010). Pressure to develop the area closer to the Truckee River will continue to be managed by local ordinances that require that there be no net loss of flood storage in the Truckee Meadows area. Truckee Meadows is expected to develop in areas outside the flood plain.

Lower Truckee River Reach

The Nevada Small Business Development Center has estimated that the population of Storey County will increase to 6,023 by 2025. While some reduction in farming and ranching is expected due to economic conditions, it is not expected that development will increase substantially since opportunities closer to Reno and Sparks exist and would lure development before this highly rural area.

4.1.3 Environmental Resources

Previous studies along the Lower Reach of the Truckee River show a decrease in the number of bird species in the area and a decrease in the number of individuals of each species. The researchers concluded that the declining trend is probably due to the loss of suitable marsh and riparian habitats. Bird habitat has continually degraded since the last study in 1976. For example, cottonwoods that depend on a wet substrate for seed germination and development are now isolated from all but the more extreme floodflows. Eventually these isolated forests will die without regenerating new growth. As a result, bird diversity and abundance will continue to decline.

Reservoir storage requirements and in-stream flow requirements are assumed to remain the same under future without-project conditions. Current negotiations are addressing the need for additional water, but many complex issues and conflicting values among the participants result in uncertainty in predicting the future without-project conditions. River system operations are assumed to remain basically the same since conflicting environmental, social, and economic factors will continue to make storage and in-stream flow changes to the system increasingly difficult with time. Because of the scarcity of water in Nevada and the institutional pressures created by that scarcity, it is assumed for planning purposes that no specific increases in flow for recovery of Federally listed fish species (LCT and cui-ui) will be implemented under the future without project conditions. However, it is assumed that Numana Dam on the lower Truckee River will be removed or modified for fish passage purposes by the PLPT in coordination with the Bureau of Indian Affairs (BIA)), in accordance with the Consolidated Appropriations Act 2008, Pub. L. 110-161, § 208(1)(B), 121 Stat. 1844 (2007), which appropriated

funding through USBOR's Terminal Lakes Project for that purpose. In addition, as required by USFWS Biological Opinion (File No. 1-5-01 -F-228) issued to USBOR in 2001, it is assumed that USBOR will install a fish screen on the Truckee Canal at Derby Dam under the future without-project condition, allowing the existing fishway at Derby Dam to be operated.

Future conditions of the ecosystem on the Truckee River will be heavily influenced by the availability of water for in-stream uses under any new water allocation arrangements. The latest effort to resolve long-standing disputes over water use and water rights on the Truckee River has been the enactment of congressional legislation known as the Fallon Pauite Shoshone Indian Tribes Water Rights Settlement Act, Pub. L. 101-618, 104 Stat. 3289 (1990). For the Act to be effective, an operating agreement, known as TROA, must be implemented. TROA would implement provisions of the Act, including interstate allocations between California and Nevada, greater flexibility in the operation of Truckee River reservoirs for efficient water use, changes to the exercise of water rights that will benefit listed species, and storage of water in Federal reservoirs for the cities of Reno and Sparks during drought. TROA was signed in 2008, but is not yet fully implemented. Instead, flows in the river continue to fall under the Orr Ditch Decree of 1944, entered by the U.S. District Court for the District of Nevada in 1944 in *United States v. Orr Water Ditch Co.*, Docket No. A3 (D. Nev. Sept. 8, 1944). However, it is assumed for planning purposes that TROA would be fully implemented in the future without-project condition.

It is assumed that no additional water will be available for restoration unless water rights are purchased. However, according to the EIS for TROA, changes in reservoir operations to modify the current flow regime could provide beneficial effects to both aquatic and terrestrial resources along the Truckee River and some tributaries, by providing flows more conducive to riparian and aquatic habitat conditions during critical times of the year. In addition, under the TROA, Washoe County is obligated to ensure that 6,700 acre-feet of water be dedicated to in-stream use. This study assumes that water to be in place under future without-project conditions.

The McCarran Ranch ecosystem restoration project has been constructed and will provide restored habitat along a 4-mile stretch of the Truckee River below Vista. (Restoration projects have also been implemented at Lockwood, 102 Ranch, and a portion of Mustang Ranch. See Section 4.1.7 below for more information about these projects.) The Nature Conservancy will likely continue to implement ecosystem restoration along the Truckee River on lands they have already purchased and possibly pursue purchase of additional lands. However, their efforts will be subject to limited funding. Because no specific restoration project has been approved and identified as likely to be funded, it is assumed for planning purposes that no additional restoration projects will be constructed on the Lower Truckee River under future without-project conditions.

4.1.4 Recreational Projects and Facilities

The future without-project condition, from a recreation perspective, is a continued but growing deficit in all types of park amenities, but particularly for group picnic areas, open space for concerts, festivals, and sport fields and practice fields.

Recreation use without the project was estimated to be 1,800,000 recreation days, based on surveys conducted earlier in the study process (2008). It is anticipated that the total recreation demand will increase because of population increases forecast for the region. From USFWS estimates, fishing use without the project is estimated to be from 61,000 to 65,000 angler days in that part of the study area influencing angler use. As quality available land and water are limited, recreation opportunities will remain limited.

4.1.5 Regional Transportation Commission Project

Washoe County Regional Transportation Commission (RTC) plans to construct a 5.5 mile north to south roadway in the USACE study area. This roadway is referred to as the SouthEast Connector and spans the Truckee River and smaller creeks in the study area. Construction is planned in two phases:

- Phase 1 begins at the intersection of Greg Street and Sparks Boulevard in the city of Sparks and continues to just south of Clean Water Way, as shown in Figure 2-14. It includes bridges over the Truckee River and over Clean Water Way. Construction of Phase 1 has begun and is scheduled for completion in April 2014. Due to the design of the bridges, there would be no placement of dredged or fill material in waters of the United States and thus no Department of the Army permit from USACE under Section 404 of the Clean Water Act, as amended permit was required for Phase 1.
- Phase 2 includes a roadway from Clean Water Way to the intersection of South Meadows Parkway and Veterans Parkway. Phase 2 hs opposition from citizen groups, including a notice of intent to sue. This roadway does impact jurisdictional waters of the United States, so the RTC must obtain a Section 404 permit. At this time, no permit application has been received by USACE. Construction is tentatively scheduled by RTC for 2014 to 2016.

Although it is considered likely that a roadway project will be built, there is significant uncertainty about the final design and effects of the roadway. This uncertainty is attributed to changes that may be required in order to obtain a permit and any changes resulting from public opposition. The SouthEast Connector is being designed to avoid any increase in water surface elevations for the 0.85% ACE flood event, but is not being designed to accommodate any future flood risk management project. Due to the high level of uncertainty, the hydraulic effects of the SouthEast Connector were not included in USACE's detailed hydraulic analysis for existing or future without project conditions. Instead, a sensitivity analysis was conducted for the NED Plan. The results of the sensitivity analysis are described in Chapter 5 of the GRR. This project is also considered further in the cumulative effects discussion of the EIS, found in Chapter 6.

4.1.6 Cultural Resources

Under the future without-project condition, adverse effects to known cultural resources are more likely to occur from abandonment or disrepair rather than future flooding in the Truckee Meadows reach. Hydraulic modeling indicates the parcels that include the Ferrari Farm historic buildings and structures and the creamery building and barn at Jones Ranch begin to experience flooding between th 1/20 ACE and 1/50 ACE. However, depths remain below 2 feet at the 1/100 ACE on the Ferrari Farms parcel, while flooding at the Jones Ranch creamery building and barn would experience flood depths of up to 6 feet for the 1/100 ACE. Prehistoric archeology sites have been inundated before and do not appear to have suffered any noticeable loss of integrity.

There is insufficient survey information available for the Lower Truckee River reaches to make a clear statement about effects under future without-project conditions. Past flood events generated debris loading on bridge piers, including the Painted Rock Bridge and this debris loading is expected to continue under future without-project conditions. The bridge deck for the Painted Rock Bridge currently overtops at approximately the 2% ACE (also referred to as 1:50, 1/50, or "50-year event"). Maintenance, repair, and potential replacement of the bridge would be expected to be continued by NDOT.

4.1.7 Tribal Lands and Issues

Within the Downtown Reno Reach, the Reno-Sparks Indian Colony would continue to be affected by potential flooding and flood damages under the future without-project conditions. Washoe

Tribe and Reno-Sparks Indian Colony trust resources in the Truckee Meadows Reach would continue to be at risk of flooding and flood damages.

Restoration on the Pyramid Lake Paiute Reservation, such as increased water quality and water level in Pyramid Lake, would be limited under the future without- project conditions. It is expected that the tribe will continue to work with Federal agencies to secure funds for restoration of water quality and the native fishery. Because there is no specific approved plan for restoration on tribal lands that has been identified to be funded, it is assumed for planning purposes that no additional restoration will be implemented on tribal lands under without-project conditions.

4.1.8 Completed Local Work Eligible for Credit

TRFMA has constructed several potential project features that had previously received approval from the Assistant Secretary of the Army (Civil Works) for crediting eligibility, referred to in the GRR by the locally used name of TRACtion projects. It is important to establish the without-project condition with regard to this completed work. The eligible flood risk management work consists of the Reno-Sparks Indian Colony levee/floodwall and the North Truckee Drain modifications. Completed ecosystem restoration work consists of the Lockwood, 102 Ranch, and Lower Mustang Ranch sites. A brief description of these follows:

- Reno-Sparks Indian Colony Levee - The project consists of 2,241 linear feet of levee and floodwall construction on the border of the Reno-Sparks Indian Colony along the Truckee River. The project was designed to contain the flood event with an estimated 0.85 recurrence interval with risk and uncertainty included.
- North Truckee Drain modifications - The realignment of the North Truckee Drain would relocate the confluence of the drain with the Truckee River approximately 4,500 feet downstream from its existing outlet and require the construction of new conveyance facilities, including concrete-lined channel and box culverts. The new confluence would be located downstream of Steamboat Creek, which would reduce the extent of the backwater experienced at the Steamboat Creek/Truckee River confluence. The drain would be placed in a buried box culvert for approximately 5,000 feet upstream of its new confluence with the Truckee River. This work has not been performed.
- Lockwood Restoration - This project is located directly upstream of the Rainbow Bend planned community. It consists of 1,510 linear feet (4.5 acres) of in-stream riffle habitat, 750 linear feet (2.1 acres) of channel habitat; 1.8 acres of wetland habitat; 1.5 acres of grassland/ herbaceous habitat; 4.7 acres of native shrub habitat; and 22 acres of native woodland habitat.
- Mustang Ranch Restoration - This project is located at Mustang Ranch along the Truckee River downstream of the Rainbow Bend community. It consists of 1,366 linear feet (3.7 acres) of in-stream riffle habitat; 2,563 linear feet (7.0 acres) of channel habitat; 10.7 acres of wetland habitat; 14.8 acres of grassland/herbaceous habitat; 90.7 acres of native shrub habitat; and 60.0 acres of native woodland habitat.
- 102 Ranch Restoration - This project is located at 102 Ranch along the Truckee River. The project consists of 875 linear feet (2.5 acres) of in-stream riffle habitat; 1615 linear feet (4.4 acres) of channel habitat; 4.9 acres of wetland habitat; 18.7 acres of grassland/herbaceous habitat; 23.4 acres of native shrub habitat; and 60 acres of native woodland habitat.

Because this local work was undertaken after approval of consideration for crediting, this work is assumed to not be in place under the without-project condition when formulating or evaluating plans for the same purpose. (For example, the Reno-Sparks Indian Colony Levee is assumed to not be in place when formulating or evaluating flood risk management measures, but would be assumed to be in place when formulating or evaluating habitatrestoration measures, if it affected any potential restoration

measures.) This assumption is necessary to determine whether the locally constructed work should be included as cost-shared features in USACE's Recommended Plan. The hydraulic, economic, and environmental analyses for flood risk management include the completed local restoration work in the without-project condition, but exclude the Reno-Sparks Indian Colony Levee from the assumed without-project condition in the event that the Reno-Sparks Indian Colony Levee deviates from the final authorization and is not compatible with the authorized plan.

4.2 ALTERNATIVE 3-FLOODPLAIN TERRACE PLAN

The Floodplain Terrace Plan would reduce damaging flood events to a 2% chance of occurrence in the Truckee Meadows reach. In addition, recreation features are proposed at various locations in the Truckee Meadows reach. The features of the Floodplain Terrace Plan are summarized in Table 4-1 and discussed by reach below.

Table 4-1. Summary of Proposed Features by Reach for the Floodplain Terrace Plan

Project Reach	Plan Features
Truckee Meadows Reach	**Flood Risk Management Features** • Construct 9,650 linear feet of on-bank (6,500 feet) and in-channel (3,150 feet) floodwalls and 31,000 linear feet of levees along the north and south banks of the Truckee River. This would also include a gravel levee maintenance road/ recreational trail. • Excavate 1.7 miles of new floodplain terraces along south bank of Truckee River from Greg St. to East McCarran Boulevard. • Place 3,100 feet of North Truckee Drain in twin 11.5-ft. x 10-ft. concrete box culverts south of I-80, including 200-feet extension to Peoples' Drain. • Cap two junction structures of Peoples' Drain. • Remediate under-seepage with seepage berms, drainage blankets, impervious berms, and relief wells. • Manage interior drainage with 14-cfs pumping station upstream of Glendale Boulevard and new flap or vertical sluice gates at all existing storm drains. • Construct 1,700 linear feet of bioengineered bank scour protection and 9,900 linear feet of rock riprap bank scour protection. • Install bridge abutment and pier scour protection at 3 bridges. • Revegetate 60 acres along 1.7 miles of new floodplain terraces with riparian vegetation on the south bank of Truckee River from Greg St. to East McCarran Boulevard. • Relocate approximately 14,100 feet of existing recreational trails along segments of the current trail alignment. **Recreation Features** • Construct 4 Canoe/kayak launch points at Fisherman's Park, Glendale Park, Cottonwood Park, and the trail access at the end of Sparks Boulevard; • Install 50 new picnic tables on the north and south sides of the river, including 36 within the recreation focus area of the proposed plan between Rock Boulevard and McCarran Boulevard; • Construct 13 fishing access locations on the north and south sides of the river, from Highway 395 to Cottonwood Park; • Construct 18,600 linear feet of new paved (9,700 feet) and unpaved (8,900 feet) recreation trail; • Construct a community park at the current location of the Excel Building on Mill Street, which would include a parking lot, playground, public restroom, medium-sized picnic shelter, and access to new recreation trails; • Install a small-sized picnic shelter at the current Sagewinds property

4.2.1 Truckee Meadows Reach

The primary flood risk management features in the Truckee Meadows reach for the Floodplain Terrace Plan are setback levees, floodwalls, and floodplain terracing, which would reduce the chance of occurrence of a damaging flood event to 2% in the Truckee Meadows reach. This reach also includes the recreation features proposed for this project. The locations of the Floodplain Terrace Plan features in the Truckee Meadows reach are shown on Figure 4-1. Figure 3-2 compares the without-project 1% chance floodplain to the with-project 1% chance floodplain for the Floodplain Terrace Plan in this reach.

Flood Risk Management Features

In addition to availability of land, the location of flood risk management features in the Truckee Meadows reach was based on reducing the linear feet of floodwalls and levees while still providing developed areas with flood protection. To accomplish this, levee and floodwall alignments were set back from the river as much as possible and floodplain terraces were proposed to increase channel capacity within the Truckee Meadows reach. The Floodplain Terrace Plan flood risk management features are described in more detail below.

Construct Floodwalls and Levees

This alternative would include construction of levee and floodwall sections along the north bank of the Truckee River from Glendale Avenue to Vista. Levees and floodwalls along the north bank of the river would be generally set back approximately 25 feet from the stream bank. Levees and floodwalls would also be constructed along the south bank from Highway 395 to East McCarran Boulevard and would be set back as far as practicable from the river to provide additional flood flow capacity. Finally, in order to maximize the existing flood storage capacity provided by the UNR Farms agricultural fields for the 2% chance occurrence floodplain, a levee would be constructed on the north side of the UNR Farms Main Experiment Station facilities near McCarran Boulevard.

Floodwalls were placed where features requiring greater land area, such as levees, would drastically affect adjacent structures or developed area. Most floodwalls would be on-bank type, as represented by the typical drawing shown in Figure 4-2. Where structures or topography do not allow sufficient space to place floodwalls along the banks, in-channel floodwalls would be constructed. A typical drawing of in-channel floodwalls is shown in Figure 4-3. The average height of the floodwall or levee structure would range from 3 to 9 feet[4].

The proposed levee alignment and floodplain terracing (described below) on the south bank for this alternative would cross the Pioneer irrigation ditch at several locations.

Terrace Floodplains

Excavation of 60 acres of floodplain terraces along 1.7 miles of the Truckee River would improve the conveyance capacity of the river in the meadows and provide an opportunity to reestablish new riparian habitat. This alternative would include terracing along the south bank of the Truckee River from Greg Street downstream to McCarran Boulevard. The lower terrace would be excavated to a depth of approximately 5 feet to an elevation that would allow the 1 in 5 chance of occurrence event to overtop it. The upper terrace would be excavated to a depth of approximately 3 feet. Widths would vary from 150 feet to 250 feet for the lower terrace and 70 feet to 80 feet for the upper terrace. A typical cross section of the floodplain terraces is shown in Figure 4-4. In addition to improving flood conveyance capacity, the terraces would also support trails for recreational uses and would be revegetated with native riparian habitat based on an environmentally sustainable design that also supports flood conveyance requirements.

[4] Top of in-channel floodwalls could be up to 21 feet from water surface.

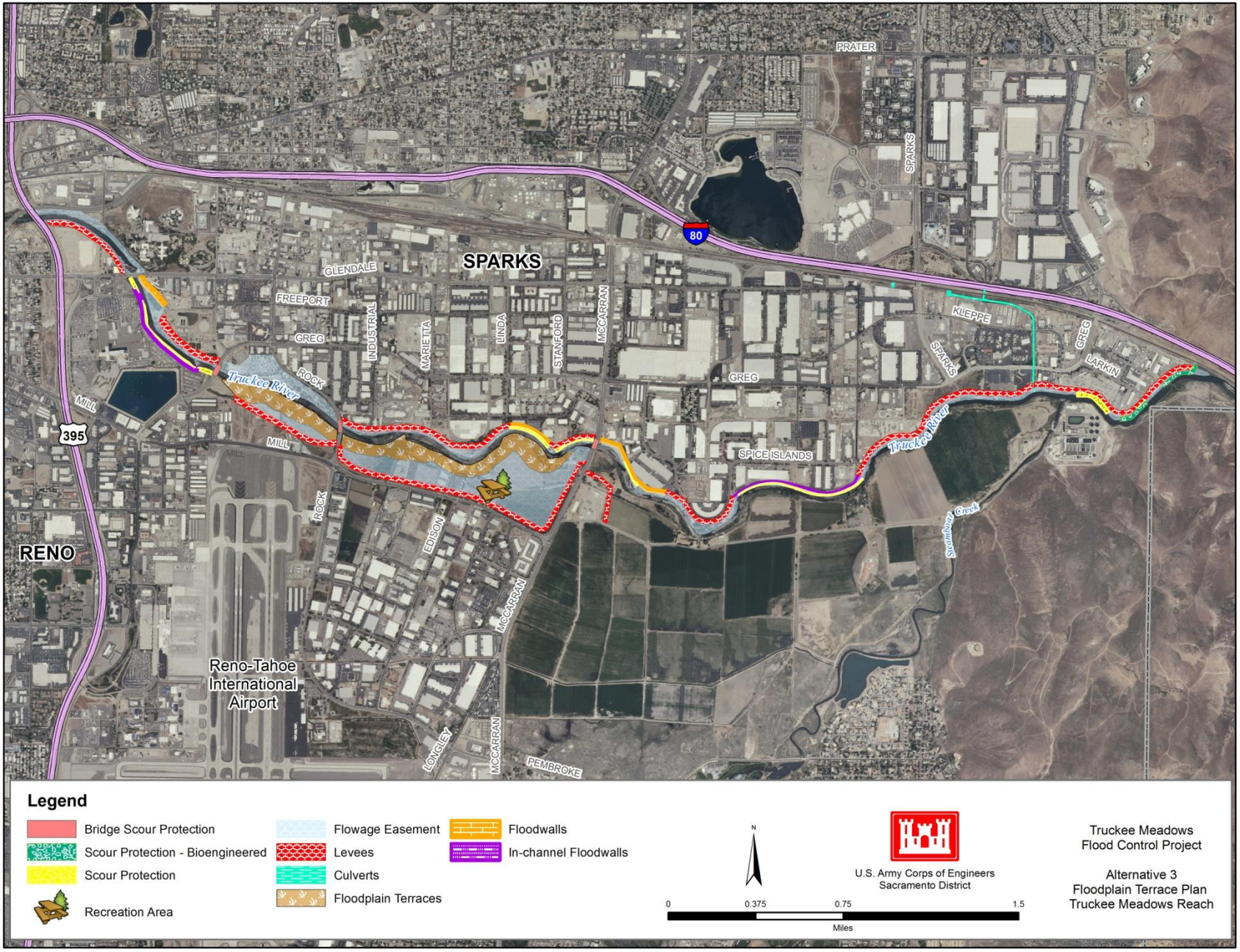


Figure 4-1. Alternative 3-Floodplain Terrace Plan – Truckee Meadows Reach Project Features.

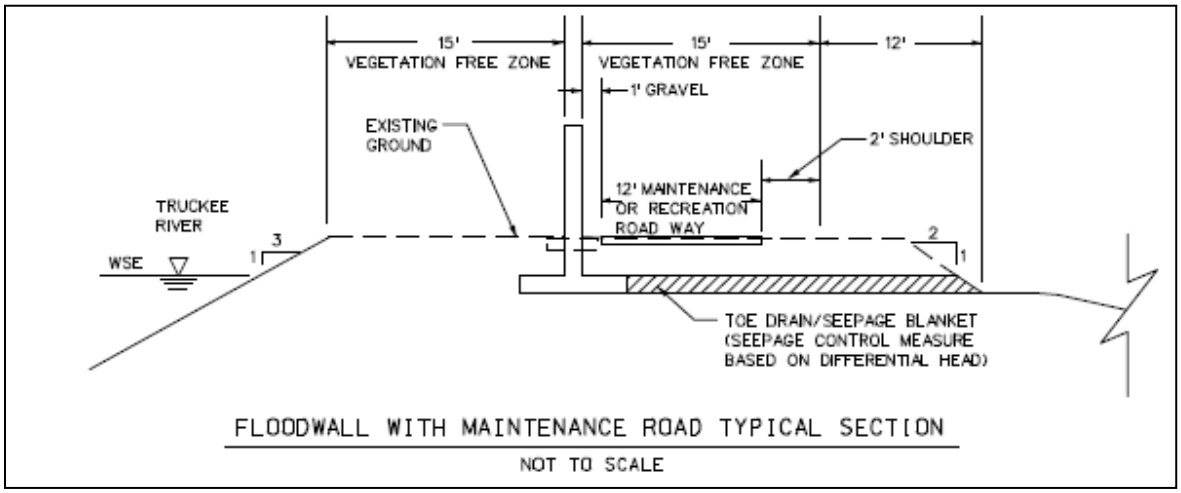
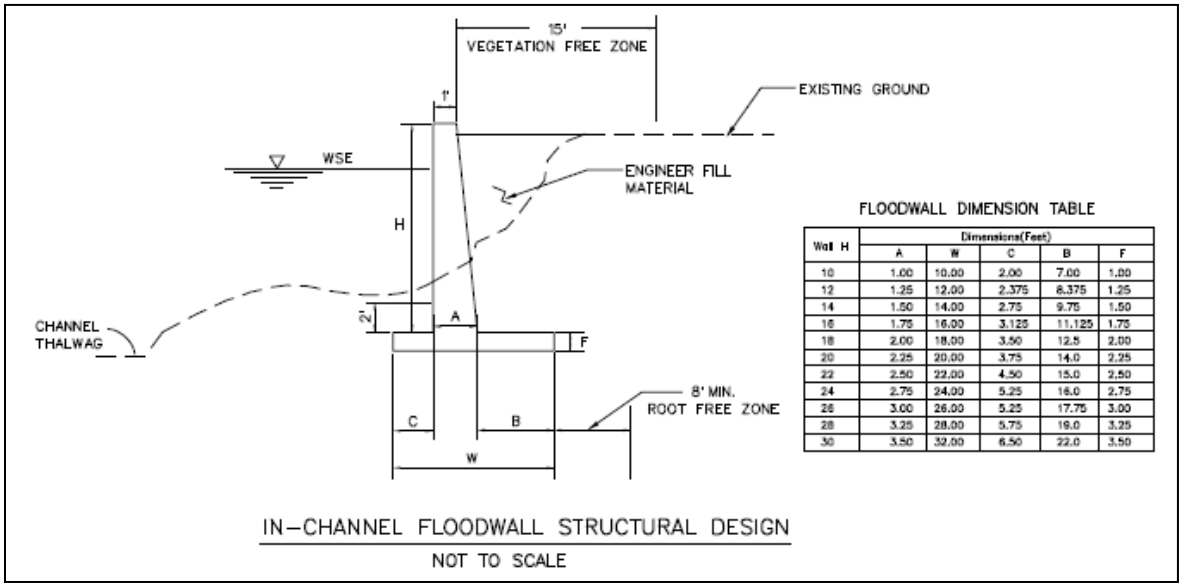


Figure 4-2. Typical drawing of on-bank floodwall cross-section.



FLOODWALL DIMENSION TABLE

Wall H	Dimensions(Feet)				
	A	W	C	B	F
10	1.00	10.00	2.00	7.00	1.00
12	1.25	12.00	2.375	8.375	1.25
14	1.50	14.00	2.75	9.75	1.50
16	1.75	16.00	3.125	11.125	1.75
18	2.00	18.00	3.50	12.5	2.00
20	2.25	20.00	3.75	14.0	2.25
22	2.50	22.00	4.50	15.0	2.50
24	2.75	24.00	5.25	16.0	2.75
26	3.00	26.00	5.25	17.75	3.00
28	3.25	28.00	5.75	19.0	3.25
30	3.50	32.00	6.50	22.0	3.50

Figure 4-3. Typical drawing of in-channel floodwall.

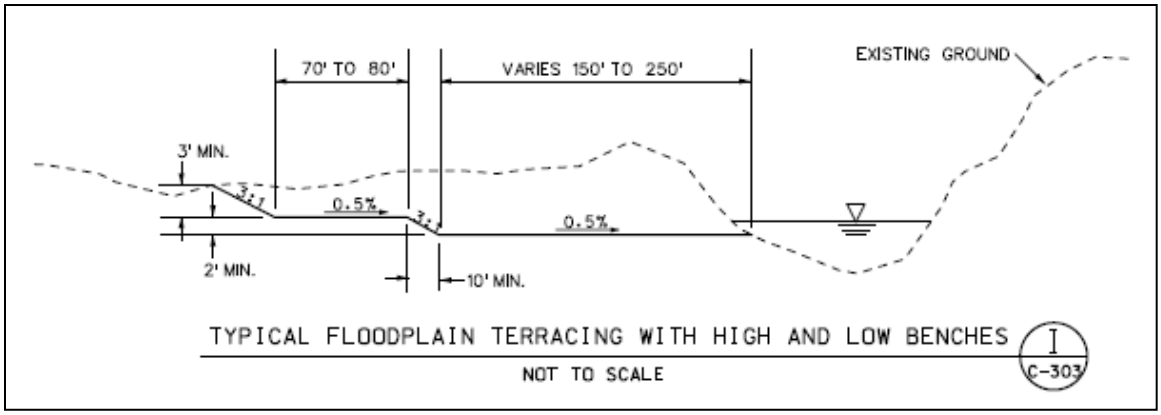


Figure 4-4. Typical Cross Section of Proposed Floodplain Terraces.

Remediate Under-Seepage.

Under-seepage, the movement or flow of water beneath a levee or floodwall, poses a concern for levee or floodwall failure along the river. Water seeping under the levee begins to erode the foundation materials, making it more susceptible to failure. Due to under-seepage concerns, design of levees and floodwalls would require seepage remediation. Four types of seepage remediation are proposed. These include (1) relief wells with a surface collection ditch, (2) seepage berms, (3) drainage blankets, (4) and impervious berms. Site-specific conditions, including soil conditions and vertical distance between design flood elevations and the ground on the landside of the levee, would determine which type of seepage remediation is implemented at the site.

Place North Truckee Drain in Box Culverts

To prevent overbank flooding upstream of the confluence with the Truckee River, the North Truckee Drain, downstream of Interstate 80 and the railroad, would be placed in two buried box culverts, 11.5 feet wide by 10 feet high, for a length of approximately 3,100 lineal feet. The reinforced concrete box culverts would include maintenance access and be installed along the existing drainage channel alignment. The box culverts would be buried a minimum of 3 feet below the new grade line, with the invert approximately 2 feet below the invert of the existing channel, and include 1.5 feet of bedding material. The new drainage structure includes an approximately 200-lineal-foot extension to the existing People's Drain and installing caps on two junction boxes of the Peoples' Drain. At the transition of the existing North Truckee Drain crossing under the railroad, a 20-foot-wide by 10-foot-high reinforced concrete box culvert would be installed.

Bed, Bank, and Pier Scour Protection Features

Many locations along the Truckee River are susceptible to erosion and bank instability. To determine if proposed project alternatives could significantly increase the potential for scouring, a bed, bank, and pier scour analysis was conducted by HDR for USACE in 2008 from upstream of Booth Street to Pyramid Lake. Where necessary, measures to ensure channel stability (e.g., bank and/or grade protection) are proposed. The analysis methodology, findings, and recommended design measures are discussed in detail in the Bed, Bank, and Pier Scour Protection Report, included in the Basis of Design appendix to the GRR. All scour protection would be designed and implemented to minimize changes to channel grade, contours, and volume. Following construction of scour protection features, the disturbed channel would be restored to pre-project conditions to the extent practicable.

Bioengineered bank stabilization techniques are proposed for potential scour sites where predicted velocity and shear stress are low enough that this protection can be sustained. Where predicted

velocity and shear stress are too high, traditional stabilization techniques such as stone riprap or gabion structures would be constructed. Since foundation information was not available for existing bridges, it was assumed that if there would be a potential increase in bridge scour under with-project conditions, a bridge scour countermeasure was proposed.

As shown in Figure 4-5, bioengineered sites would in general include riprap toe protection to protect against bank failure. Vegetated coir mats, which typically include sedge, rush, bulrush, and native grass species, would be installed from the top of the riprap elevation to the top of the existing bank or 2 feet above the design water surface elevation.

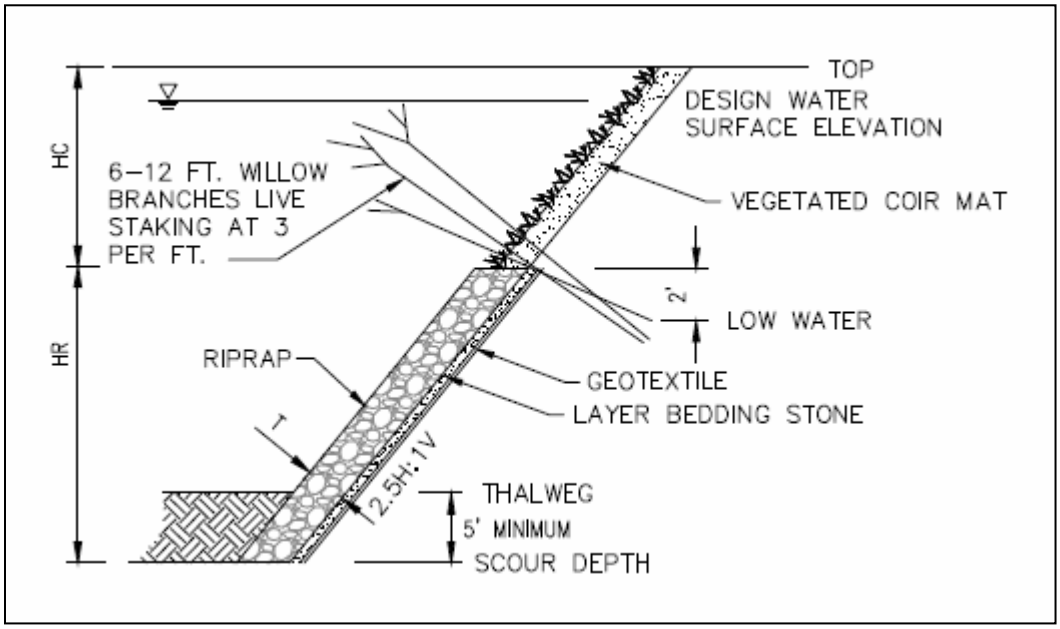


Figure 4-5. Typical Bioengineered Bank Scour Protection Measures.

Stabilization measures composed of riprap are divided into four basic categories: (1) armor techniques that include the placement of riprap along the bank face to prevent erosion due to the sheer force of the flowing water; (2) flow deflection structures that extend outward from the bank, normal or angled to the flow, and function by forcing the higher velocity flows away from the bank for some distance downstream; (3) slope stabilization measures that include placing large stone sections at the toe of the bank slope to resist translational or rotational failures; and (4) energy reduction measures that include a wide array of techniques that reduce the energy gradient of the stream and, thus, its ability to induce erosion.

Until further analysis is carried out in the detailed design phase of the project, for performance and conservative cost-estimating purposes the riprap stabilization measures proposed in this planning phase are placement of riprap along the bank face and placement of rock at the bank toe. Figure 4-6 shows the typical placement of riprap from the top of levees or from 2 feet above the highest design water surface elevation to the maximum scour depth below the channel. Typical bridge scour protection (see Figure 4-7) would entail placement of stone riprap around piers and abutments at depths and thicknesses commensurate with shear stresses and velocities predicted at the bridge locations.

The 2008 scour analysis indicated that water velocities are too high or bank instability is too severe in the Truckee Meadows reach to accommodate bioengineered bank stabilization in all but two locations, as shown on Figure 4-1. The remaining locations identified would employ engineering

practices such as rock riprap installation. Currently, it is estimated that this alternative would require approximately 1,700 linear feet of bioengineered bank scour protection and 9,900 linear feet of rock riprap bank scour protection in the Truckee Meadows Reach. However, ongoing sedimentation and stability evaluations, in conjunction with development of construction-design-level hydraulic models following project authorization, would refine where and what type of scour protection would be required.

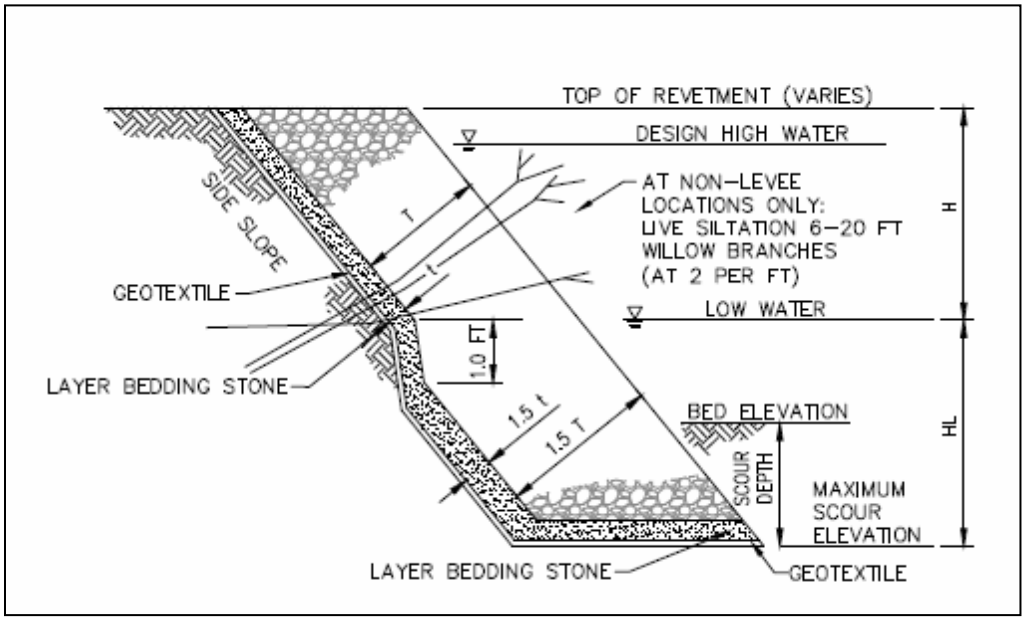


Figure 4-6. Typical Rock Riprap Bank Scour Protection Measures.

Manage Interior Drainage.

Construction of new features such as levees and floodwalls may impede the existing flow of stormwater runoff into natural or constructed drainage areas, thereby creating residual flooding behind these features. To manage this potential new source of flooding, interior drainage management systems would be constructed as part of the project to maintain the area's existing stormwater runoff drainage capacity. Interior drainage management measures typically include pumping stations and gravity drain lines with flap gates through levees/floodwalls. The Floodplain Terrace Plan would require 1 pump station in the Truckee Meadows reach.

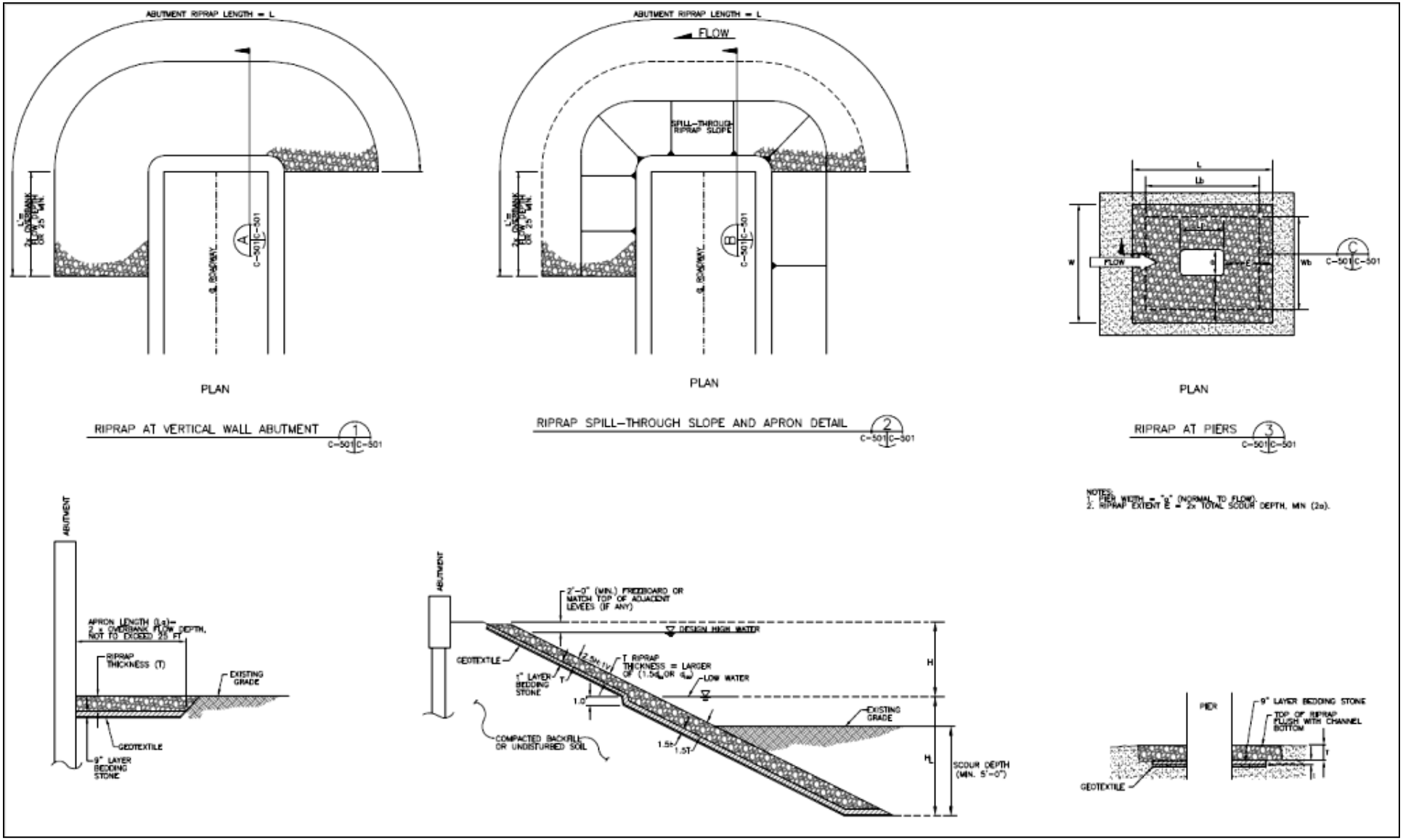


Figure 4-7. Typical Bridge Pier and Abutment Scour Protection Measures.

Modify or Remove Existing Buildings

Construction of flood risk management features along the alignment in the Truckee Meadows reach would affect 26 existing buildings, possibly requiring them to be modified or removed as part of the project. These buildings, located along both banks of the Truckee River, include two one-story commercial buildings, one two-story commercial building, four warehouses, two residences, and one storage building.

Recreation Features

The recreation features proposed for the Floodplain Terrace Plan in this reach are located within the footprint of the proposed flood risk management features. The proposed recreation plan layout is included in Appendix A. These features include:

- Four Canoe/kayak launch points at Fisherman's Park, Glendale Park, Cottonwood Park, and the trail access at the end of Sparks Boulevard;
- Thirty-two new picnic locations on the north and south sides of the river, including sixteen within the recreation focus area of the proposed plan between Rock Boulevard and McCarran Boulevard;
- Thirteen fishing access locations on the north and south sides of the river, from Highway 395 to Cottonwood Park;
- 18,600 linear feet of new paved and unpaved recreation trails;
- a community park at the current location of the Excel Building, which would include a parking lot, playground, public restroom, medium-sized picnic shelter, and access to new walking and nature trails; and,
- a small-sized picnic shelter at the current Sagewinds property.

4.3 ALTERNATIVE 2-DETENTION PLAN

The Detention Plan would reduce damaging flood events to a 1% chance of occurrence in the Truckee Meadows reach. The features of this alternative are summarized in Table 4-2 and discussed by reach below.

4.3.1 Truckee Meadows Reach

Flood Damage Reduction Features

The location of flood risk management features in the Detention Basin Alternative was based generally on availability of land to construct levees or floodwalls. In addition, this alternative would include two detention basins and the realignment of the North Truckee Drain. The location of the Detention Plan features in the Truckee Meadows reach is shown on Figure 4-8. Figure 4-9 compares the without-project 1% chance floodplain to the with-project 1% chance floodplain for this alternative in this reach.

Construct Levees and Floodwalls

Floodwalls were placed where features requiring greater land area, such as levees, would drastically affect adjacent structures or developed area. Most floodwalls would be on-bank type, as represented by the typical drawing shown in Figure 4-2. Where structures or topography do not allow sufficient space to place floodwalls along the banks, in-channel floodwalls would be constructed. A

typical drawing of in-channel floodwalls is shown in Figure 4-3. The average height of the floodwall or levee structure would range from 6 to 9 feet.

Table 4-2. Summary of Proposed Features by Reach for Alternative 2-Detention Plan .

Project Reach	Plan Features
Truckee Meadows Reach	**Flood Risk Management Features** • Construct 9,650 linear feet of on-bank (3,900 feet) and in-channel (5,950 feet) floodwalls and 28,000 linear feet of levees along the north and south banks of the Truckee River. • Relocate Clean Water Way. • Construct levees and floodwalls along Steamboat Cr. and Boynton Slough. • Realign North Truckee Drain south of I-80. • Lengthen E. McCarran Blvd. Bridge. • Construct 1,690 linear feet of bioengineered bank scour protection and 11,156 linear feet of rock riprap bank scour protection. • Install bridge abutment and pier scour protection at 4 bridges. • Extend culvert along Boynton Slough upstream of Longley Lane. • Remediate under-seepage. • Manage interior drainage. • Construct UNR Farms detention basin. • Construct Huffaker Hills detention basin. **Recreation Features** • Construct 4 Canoe/kayak launch points at Fisherman's Park, Glendale Park, Cottonwood Park, and the trail access at the end of Sparks Boulevard; • Install 32 new picnic locations on the north and south sides of the river, including sixteen within the recreation focus area of the proposed plan between Rock Boulevard and McCarran Boulevard; • Construct 13 fishing access locations on the north and south sides of the river, from Highway 395 to Cottonwood Park; • Construct 25,500 linear feet of new paved and unpaved recreation trail; • Construct a community park at the current location of the Excel Building on Mill Street, which would include a parking lot, playground, public restroom, medium-sized picnic shelter, and access to new recreation trails; • Install a small-sized picnic shelter at the current Sagewinds property.

Levees and floodwalls along the north bank of the Truckee River would be generally set back approximately 25 feet from the stream bank. Levees and floodwalls along the south bank would be set back as far as practical to provide additional flood flow capacity.

Containment features along Boynton Slough and Steamboat Creek would be primarily floodwalls. These containment features would be needed in this alternative to contain the coincident flows in these tributaries, as well as the backwater effects on the Truckee River due to the Vista Reefs. The channel constriction at the Vista Reefs backs flood water flows up the river, as well as up the North Truckee Drain and Steamboat Creek. Floodwalls along the drain would be sized to hold flood volumes equaling the backwater flows from the river, as well as coincident flows from the tributaries.

Remediate Under-Seepage

The levees and floodwalls proposed for this alternative would require seepage remediation similar to the Floodplain Terrace Plan , above. Site-specific conditions, including soil conditions and vertical distance between design flood elevations and the ground on the landside of the levee, would determine which type of seepage remediation is implemented at each levee and floodwall site.

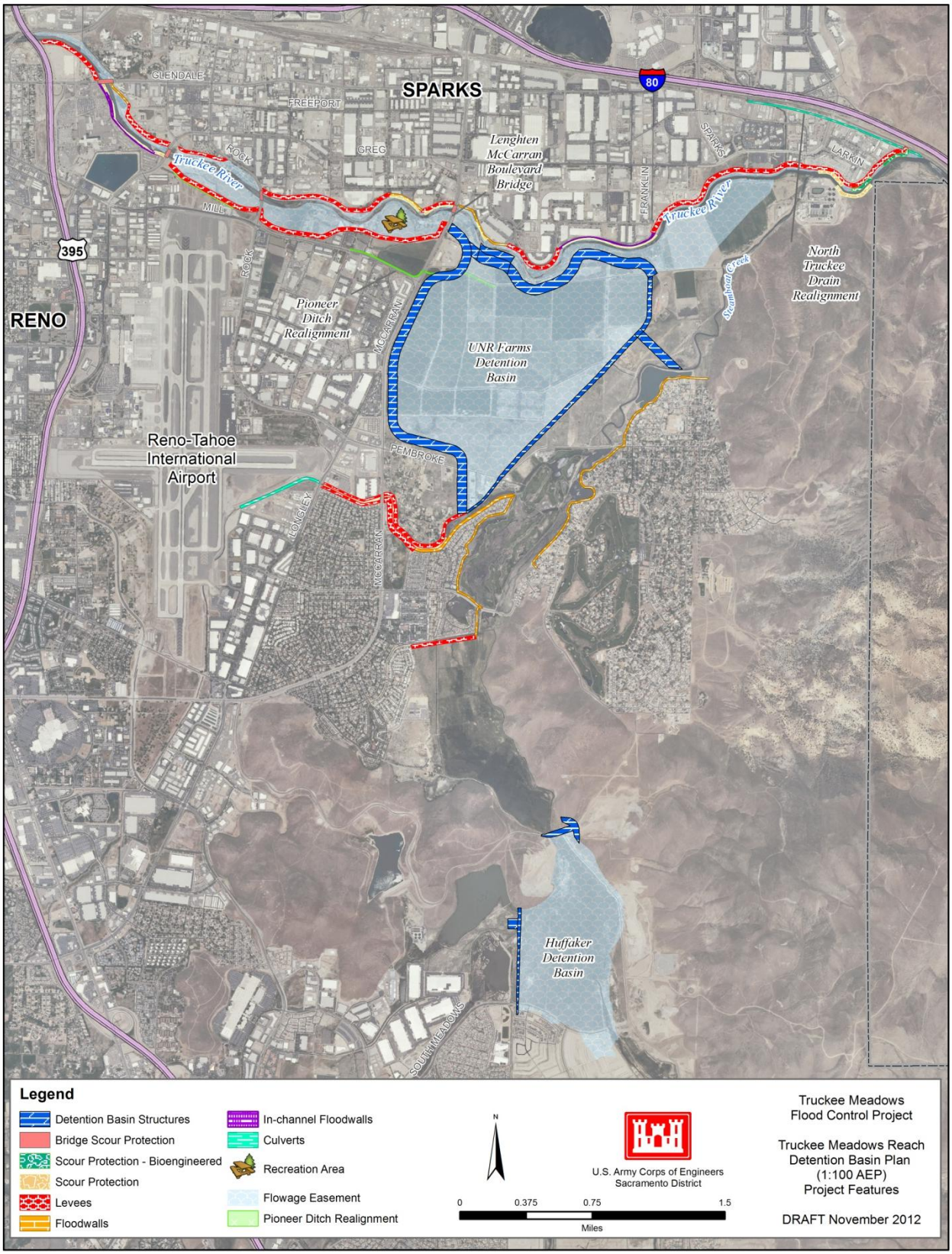


Figure 4-8. Alternative 2-Detention Plan – Truckee Meadows Reach Project Features.

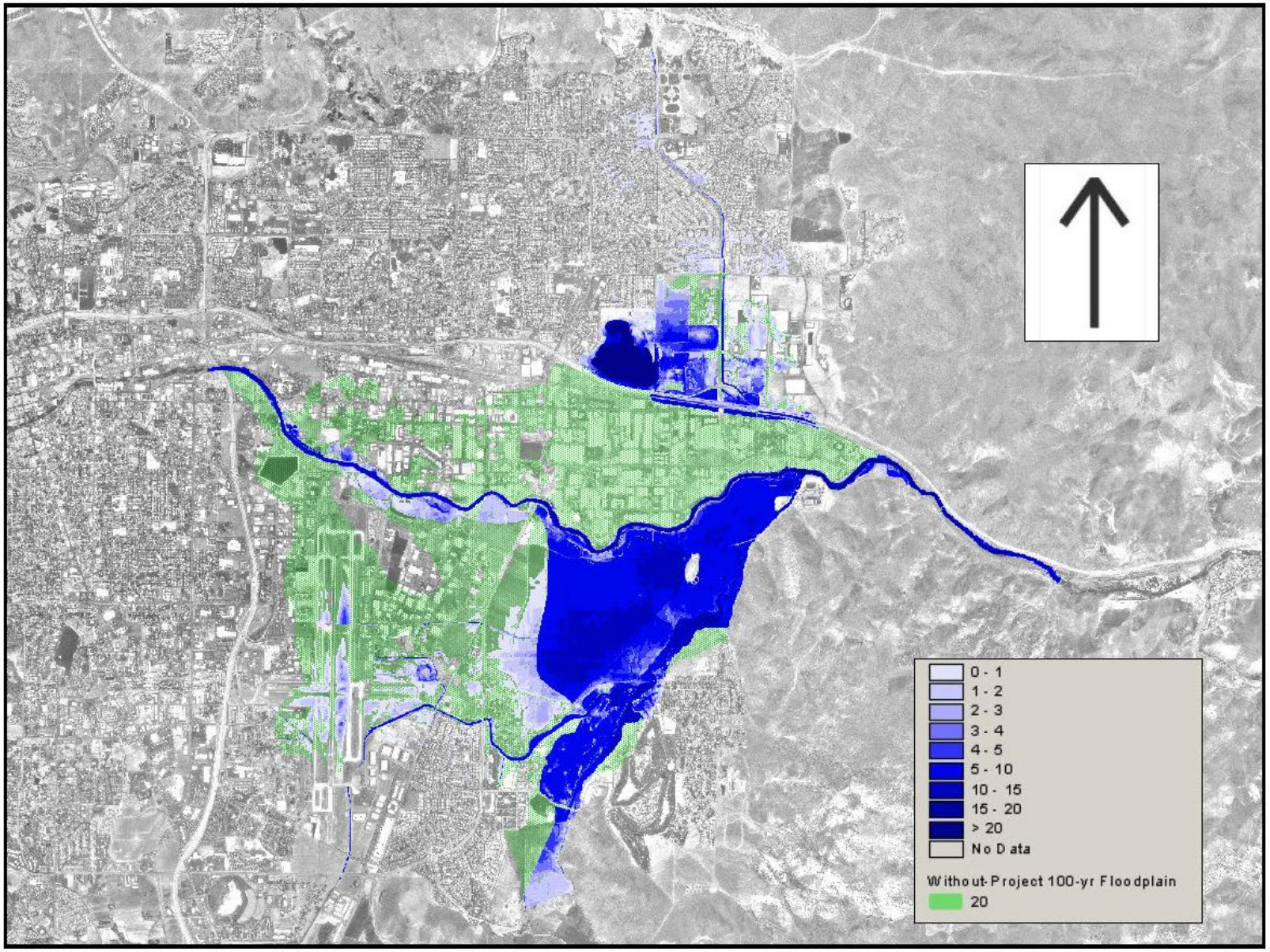


Figure 4-9. Alternative 2-Detention Plan With-Project (blue) and Without-Project (green) Floodplains – Truckee Meadows Reach.

Manage Interior Drainage

Construction of new features such as levees and floodwalls may impede the existing flow of stormwater runoff into natural or constructed drainage areas, thereby creating residual flooding behind these features. To manage this potential new source of flooding, interior drainage management systems would be constructed as part of the project to maintain the area's existing stormwater runoff drainage capacity. Interior drainage management measures typically include pumping stations and gravity drain lines with flap gates through levees/floodwalls. The Detention Plan could require the following interior drainage features in the Truckee Meadows reach:

- a 14 cfs pump station located at the Wal-Mart parcel combined with two 42 inch flapgated gravity RCP's;
- a pump station located on the west side of the detention basin embankment and east of South McCarran Boulevard (just south of Capital Boulevard) to convey runoff flows in the airport ditch into the detention basin; and
- a flapgated 2-foot gravity RCP to drain the commercial properties located behind a floodwall just upslope from the Huffaker Detention Basin flood pool.

Modify Bridges

To provide greater conveyance capacity for flood flows, the East McCarran Boulevard Bridge would be lengthened approximately 250 feet to the south. Along Boynton Slough, upstream of Longley Lane, the existing culvert would be extended approximately 1,800 linear feet. This work would be located in the immediate vicinity of the Reno-Tahoe International Airport, whose proximity precludes the use of levees or floodwalls in this area.

Construct Detention Basins

Two new detention basins would be constructed, one off-stream at UNR Farms and one on-stream along Steamboat Creek at Huffaker Hills (approximately 5 miles upstream of the main stem of the Truckee River). The detention basins would temporarily store peak flood flows in the Truckee Meadows and spread out the release of flood water downstream from the Truckee Meadows over time so that downstream reaches would not experience significant increases in peak flood volumes over existing conditions.

The UNR Farms detention basin would be created by constructing levees and an inlet diversion from the Truckee River just downstream of the McCarran Boulevard Bridge. The outlet for the detention basin would be near Steamboat Creek. This off-stream facility would divert and store some of the Truckee River flood flows in order to reduce the peak discharge and volume of water carried downstream. This would reduce backwater accumulating upstream of the Truckee River's natural constriction at the Vista Reefs, reducing the water-surface elevations during a flood in much of the Truckee Meadows area. The detention basin would also reduce peak discharge downstream from the reefs. A portion of Clean Water Way would be realigned to pass over the levees constructed to form the detention basin and maintain access to the wastewater treatment facility. Also, slope protection would be placed along the levees forming the UNR farms detention basin.

The Huffaker Hills detention basin would be created by constructing a dry dam across Steamboat Creek at the Huffaker Narrows on the eastern end of Huffaker Hills. In addition, a levee would be constructed along the west side of the detention basin near South Meadows Parkway. The two low-level outlets for the detention basin would be located within the dam structure and would be sized to pass creek flows up to 500 cfs with minimal backwater effects. With events above 500 cfs, this on-stream facility

would begin to store some of the Steamboat Creek flows in order to reduce the peak discharge and volume of water carried downstream. As with the UNR Farms detention basin, this facility would temporarily reduce backwater accumulating upstream of the Vista Reefs during floods, reducing the water-surface elevations in much of the Truckee Meadows area, as well as downstream of Vista.

Realign North Truckee Drain

The realignment of the North Truckee Drain would relocate the confluence of the drain with the Truckee River approximately 4,500 feet downstream from its existing outlet and require the construction of new conveyance facilities, including concrete-lined channel and box culverts. The new confluence would be located downstream of Steamboat Creek, which would reduce the extent of the backwater experienced at the Steamboat Creek/Truckee River confluence. The drain would be placed in a buried box culvert for approximately 5,000 feet upstream of its new confluence with the Truckee River. A concrete exit channel would be constructed upstream of the mouth of the drain at its exit at the Truckee River.

Bed, Bank, and Pier Scour Protection Features

As was described for the Floodplain Terrace Plan , this alternative would also require bed, bank, and pier scour protection features in the Truckee Meadows reach to ensure channel stability. Although this alternative wasn't specifically analyzed in the 2008 HDR bed, bank, and pier scour analysis, the changes in flow and velocity for this alternative are expected to be similar to those covered in the Floodplain Terrace Alternative; therefore, for purposes of this analysis, scour protection features are assumed to be the same for both alternatives.

Modify or Remove Existing Buildings

Construction of levees and floodwalls along the Truckee River for this alternative would affect the same buildings as the Floodplain Terrace Plan , possibly requiring them to be modified or removed as part of the project. These buildings, located along both banks of the Truckee River, include two one-story commercial buildings, one two-story commercial building, four warehouses, two residences, and one storage building. In addition, with construction of the UNR Farms Detention Facility, the Jones Ranch building along Clean Water Way would also require modification or removal to install the north levee of the detention facility.

Recreation Features

The recreation features proposed in the Floodplain Terrace Plan , as discussed in Section 4.2.1, would also be included in the Detention Plan , although the layout would be slightly different in order to accommodate the alignment of this alternative's flood risk management features.

4.4 CONSTRUCTION CONSIDERATIONS

4.4.1 Staging, Borrow, Stockpile, and Disposal Sites

The contractor's staging areas would be located at existing open agricultural areas south of the Truckee River and open areas along the bikeway north of the Truckee River, near existing bridges and immediately adjacent to the detention basin sites. The staging areas would likely be no more than 0.5 acre in size at any one location. The staging areas would have temporary fencing placed around the perimeters and around any sensitive vegetation within their confines.

Temporary work area easements would be required to allow for the movement of construction equipment to and within the construction site. In general, these temporary easements would be 25 feet in

width and extend from the landside and/or waterside edge of the features to be constructed. In the restricted Downtown Reno reach, generally a 15-foot temporary easement would be used for floodwall construction. In-channel floodwalls would require temporary work area easements on both the waterside and landside. A 25-foot temporary easement would be located within the channel on the waterside of the floodwall.

Borrow material for levee construction would be obtained primarily from usable soils (estimated at approximately 108,000 cubic yards) excavated to form the terracing features in the Truckee Meadows reach for all construction alternatives. Any additional material needed for levee construction would be obtained from commercial sources within 15 miles of the project site.

Disposal of excess or non-reusable material excavated from the Truckee Meadows reach would be at a proposed disposal site at the Granite Pit location near Tracy. Disposal of surface debris and trash would likely be at local landfills in the Reno and Sparks areas.

4.4.2 Access Routes

The access roads for the project would be highways and local paved roads to the work areas. No new paved roads would be constructed to allow access to the project sites, but temporary dirt roads would be constructed, as needed, to provide access to the main stem of the river and detention basin sites. Access roads are discussed further in Section 5.12 of this EIS.

4.4.3 Construction Schedule

Construction would begin in the summer of 2015 at the earliest and is expected to last approximately 8 years, including 3 years of plant establishment. In order to comply with the Federal Clean Water Act and minimize effects to the Truckee River fishery, including the endangered cui-ui and threatened LCT, the construction window for all in-river work would be between July 1 and September 30 of each construction year.

For the Detention Plan, bridge extensions in the Truckee Meadows reach would be constructed during the first and second years to accommodate the footprints of levees, floodwalls, and benching features. Due to heavy traffic on the Truckee Meadows bridges, no more than one bridge improvement per year per reach would be constructed. For both action alternatives, construction would then progress from downstream to upstream in the project area, taking into consideration potential changes in water-surface elevations as new flood risk management features are completed. Recreation components would be constructed as part of the flood risk management features.

To avoid or minimize adverse effects from soil erosion, revegetation features in the Truckee Meadows reach would be constructed immediately following the completion of flood risk management features for each construction year.

4.5 ENVIRONMENTAL COMMITMENTS

In order to minimize or avoid significant effects to resources within the project area, many best management practices (BMPs) and mitigation measures have been adopted or incorporated into the alternatives. Following is a summary of the best management practices and mitigation measures to be implemented.

4.5.1 Best Management Practices

Water Quality

BMPs would be used to manage sediment and erosion during the construction of the flood risk management project. Construction period preparedness and weather condition BMPs control erosion and sediment through management and monitoring that includes: ensuring the contractor has the appropriate equipment and materials available at the start of construction to complete the project within the planned time frame; the contractor is prepared to dewater high groundwater areas for excavation; contingency BMP materials are available on-site for quick installation at exposed and/or affected areas; all disturbed areas are treated with erosion control measures, and coordination between vegetative planting and grading is in place prior to construction; excavation in wetland areas is scheduled to minimize groundwater effects on construction dewatering discharge; and daily weather monitoring for thunderstorms.

The contractors would prepare and implement an erosion control plan and a Stormwater Pollution Prevention Plan (SWPPP) to control erosion, storm water runoff, sedimentation, and other construction-related pollutants during all phases of construction, and until the construction is complete and all disturbed areas are permanently stabilized throughout the project area. The construction window for all in-river work would be between July 1 and September 30, when flows are at their lowest, for each construction year.

The short-term increase in sediment would be reduced to less-than-significant levels by implementing the following measures during construction:

- All soils would be stabilized within 14 days of completed work. Hydromulch would be secured with an organic tackifier.
- Construction equipment would be limited to the actual area being disturbed and vehicles may not travel in areas to be left in their natural state.
- Short-term staging of soil material would be surrounded by a silt fence, fiber rolls, or other perimeter.
- Long-term staging of soil material (longer than one week) would be placed away from the stream, vegetated, and surrounded by a berm perimeter to control runoff and erosion.
- Existing vegetation would be left in place to the maximum extent possible.
- Bare ground would be watered to reduce wind and water erosion.
- Work in the water would be conducted during the low-flow period.
- The contractor would be required to conduct water quality tests specifically for increases in turbidity and sedimentation caused by construction activities. Water samples for determining background levels would be collected in the Truckee River and its tributaries that are within the general vicinity of the construction sites. Testing to establish background levels would be performed at least once a day when construction activity is in progress. The contractor would monitor turbidity and settleable solids at least daily and turbidity at least hourly when a turbidity plume is visible. If turbidity limits are exceeded, the contractor would slow the rate of earthwork or use other means to comply with the requirements, including stopping construction activities until the plume has cleared.
- Sediment barriers would be installed on graded or other disturbed slopes, as needed, to prevent sediment from leaving the project sites and entering nearby surface waters.
- The contractor would have a designated area for vehicle and equipment maintenance that is self-contained to protect groundwater, surface water, and soils from contamination.

- Dewatering water would be discharged into a meadow a sufficient distance from the stream to ensure no direct discharge back to the stream.
- Suitable stream crossings would be constructed and/or existing and appropriate access will be used to avoid damage to the streambanks and bed.
- Banks would be revegetated at the end of each construction season. Hydromulch would be secured with an organic tackifier.
- Construction traffic would be restricted to predetermined routes.
- Traffic during wet weather or within the wet zone would be minimized and pivoting excavators would be used.
- A spill prevention and containment countermeasure plan that addresses all potential mechanisms of contamination would be developed. Suitable containment materials would be on-hand in the event of a spill. All discarded material and any accidental spills would be removed and disposed of at approved sites.
- Instream time and the number of stream crossings for heavy equipment would be minimized to the extent possible. Stream crossings would be perpendicular to the stream and in designated areas using gently sloping and stable banks.
- Equipment and vehicles operated within the floodway would be checked and maintained daily to prevent leaks of fuels, lubricants, and other fluids to the river.

Fisheries

- Construction activities immediately in and adjacent to the river channel would be done during low flows (i.e., between July 1 and September 30) while maintaining downstream water flow. De-watering associated with construction would not occur during the spring season to avoid migration periods of native fish (especially federally listed fish species). Personnel and equipment would be on-hand to conduct fish rescues if needed, placing fish outside areas of construction. Fish salvage operations would be coordinated with USFWS and NDOW at least 24 hours prior to implementation.
- Excavation within the stream channel would be limited to the extent possible. If all the excavated material is not relocated to another portion of the project area, it would be completely removed from the floodplain so it does not reenter the river during the next high flow event. These materials would be located on previously disturbed upland areas to the extent possible.
- The number of stream crossings for heavy equipment would be minimized to the extent possible. Stream crossings would be perpendicular to the stream and in designated areas using gently sloping and stable banks.
- Alternatives that include the use of surface water would implement measures that minimize fish entrainment and water consumption.
- USACE would use biotechnical bank stabilization methods to the extent possible in areas adjacent to the Truckee River and Steamboat Creek.
- Equipment shall be operated slowly and deliberately to minimize potential injury and mortality of juvenile and adult fish during excavation and placement of fill materials within the active channel. The contractor shall be instructed that before submerging an excavator bucket, or placing fill gravel below the water surface, the excavator bucket or equipment will be operated to “tap” the surface of the water.
- Dewatering of the existing channel would be conducted slowly and deliberately to prevent the

mortality of juvenile or adult LCT or cui-ui.

Vegetation and Wildlife

- Work activities outside the river channel would be scheduled to minimize adverse effects to wildlife resources. Construction would occur after nesting and rearing of young birds have been completed. To ensure effects to nests or young do not occur, surveys would be conducted prior to construction to determine whether any birds are nesting in the area.
- Prior to revegetation efforts, invasive perennials such as whiteop species would be treated with herbicide prior to any revegetation efforts. For revegetation areas adjacent to the river and wetlands, perennial invasive species would be hand-pulled. Re-growth would be treated with weed herbicide using a wick applicator.
- In areas dominated by the invasive, non-native species tall-whitetop, all plant materials removed during construction would be left on-site in a location that would not allow plant material to enter waterways. To avoid spreading weeds, all machinery and vehicles that leave the site would be washed on site to remove attached seeds and roots.
- If hay/straw bales are used for sediment control, they would be certified weed-free to reduce establishment/reestablishment of invasive weeds.
- Update and implement the Comprehensive Wildlife Sensitive Weed Control Plan (Otis Bay Consulting 2006). Removal and control of noxious weeds will provide wildlife enhancement features for the project. Manual removal measures are recommended in sensitive areas near waterways and wetlands. If chemicals are used in these areas, a wick applicator and a water labeled formula of 2,4-D should be used for infested areas located within 30 ft of the Truckee River and associated wetlands. Chemical uses in other areas should be applied according to the manufacturer's specifications by state-approved weed control experts.
- Avoid effects to woody vegetation at and adjacent to the construction staging areas to the extent possible.
- Effects to the grassland/herbaceous cover-type would be minimized by reseeding all areas with native grasses and forbs, including construction staging and disposal areas.
- Temporary roads would be constructed to the minimal number, width, and total length consistent with construction activities. Roads would be minimized in sensitive areas (e.g., riparian). Water bars and other erosional controls would be installed for permanent roads or trails.
- Coordination efforts with USFWS, NDOW and the PLPT would continue throughout the preconstruction engineering and design phase with an emphasis on features directly affecting fish and wildlife resources.
- Measures for monitoring and associated adaptive management would be implemented to verify the performance of mitigation, construction BMPs, and other conservation features. Lessons learned from the earlier phases of construction would be applied to later phases.
- Land clearing, burning, and mowing would be conducted outside of the avian breeding season if possible; otherwise, a qualified biologist would survey the area prior to land clearing or mowing. If nests of native, non-invasive species are located or if evidence of nesting of such species is observed, a protective buffer would be delineated and the entire area avoided, preventing the destruction or minimizing disturbance of the nest until the species are no longer active. The size of the protective buffer would depend on the habitat requirements of the particular species.
- Removal of potential nesting substrate (e.g., trees, shrubs) that may be affected by construction would occur between November 1 and February 28 (i.e., outside the nesting season) to ensure that

active nests are not removed as a result of construction activities.

- Any work in the vicinity of the East McCarran Boulevard Bridge should be performed between December 1 and March 31 to minimize the potential for bat colonies to be disturbed as a result of construction activities.

Prime and Unique Farmland

- To the extent practicable, the top 6 inches of topsoil in prime farmland areas that fall within the levee and floodplain terrace footprints would be stripped and stored for use during post-construction revegetation activities.

Recreation

- Trail detours and closures would be coordinated with the appropriate agencies to minimize effects to pedestrians and bicycle traffic.
- Construction of project features would be phased by construction contract.
- Once construction is completed for each contract, the temporary easement and staging areas would be restored and returned to pre-project conditions and uses.

Public Health and Safety

- Access would be restricted along the Truckee River at and near in-channel construction activities.
- Signage regarding access limits and detours for trails and parks would be coordinated with the appropriate city parks and recreation department and posted in the appropriate areas upstream and downstream of construction sites.
- Temporary portage sites would be established to enable boaters to exit the river and detour around the construction area.

Aesthetics

- Landscaping and architectural features would be incorporated in the setting where features are affected by levees and floodwalls.
- Incorporate form, line, color, and texture aspects of the existing landscape into the design of flood risk management elements to reduce the contrast effect.
- Incorporate elements of existing and historical design in the architecture of replacement bridges.
- Avoid straight line elements and incorporate the curving nature of the river into structural design.
- Avoid elements that would create view blocks, particularly along the recreation trail and residential areas.
- Incorporate bioengineered bank stabilization methods where possible and allow for vegetation to grow amongst bank stabilization materials.
- Design levees with recreation trails on top so that the river corridor can be viewed by the recreating public, particularly for reaches where no access is currently available.
- For floodwalls and concrete structures, incorporate sealants that allow for effective removal of graffiti.

Traffic and Circulation

- Any surface damage to local roads used for construction haul routes would be repaired to pre-construction conditions. The determination of pre-construction conditions is at the discretion of the lead agency in consultation with regional and local transit authorities.
- Hour restrictions for haul trucks would be implemented.
- Transportation Demand Management measures would include the following:
  - Provide employee incentives for carpooling.
  - Identify off-site parking areas where shuttles can arrive to pick up employees headed into the construction staging site.
  - Provide resources for marketing to encourage alternative modes to driving to work for residents or other employees not associated with the project
- High collision intersections would be identified to construction drivers. Drivers would be informed and trained on the various types of haul routes, which areas are more sensitive (i.e., high level of residential, education centers, and/ or narrow roadways). Drivers would attend sessions once a year. Drivers would not be allowed to detour on adjacent streets. Finally, success would be measurable and employees demonstrating good driving records would be rewarded.
- A public information campaign (including use of street banners, flyers, commercials, etc.) would be used to inform the general public of the haul routes and encourage use of alternative roadways by residents of the area. Detour closures would be heavily promoted for drivers and businesses in the project area to make sure motorists are aware of which alternate routes to use.
- Bike lanes and routes would be temporarily relocated to add capacity and improve safety if such concerns arise based on further peak hour analysis. The general public would be provided information about bike lane and route changes through the normal community information channels provided by the project.
- Street parking, where useful, would be temporarily restricted during the years of construction during peak hours only. This would potentially provide extra street width thereby enhancing capacity and traffic flow.

Air Quality

The on-road and non-road mobile equipment typically used on construction projects are subject to U.S. Environmental Protection Agency (USEPA) regulations.

The project contractors will be required to comply with Washoe County District Regulation 040.030 for the control of fugitive dust from construction projects. A dust control permit will be obtained from the district before the start of construction. The permit will describe all control measures to be implemented before, during, and after any dust generating activity. Potential control measures may include, but are not limited to:

- Paving.
- Pre-wetting.
- Applying dust suppressants.
- Stabilizing with vegetation, gravel, re-crushed/recycled asphalt or other forms of physical stabilization.

- Limiting, restricting, phasing and/or rerouting motor vehicle access.
- Reducing vehicle speeds and/or number of vehicle trips.
- Limiting use of off-road vehicles on open areas and vacant lots.
- Utilizing work practices and/or structural provisions to prevent wind and water erosion onto paved public roadways.
- Using dust control implements appropriately.
- Installing one or more grizzlies, gravel pads, and/or wash down pads adjacent to the entrance of a paved public roadway to control carry-out and trackout.
- Keeping open-bodied haul trucks in good repair, so that spillage may not occur from beds, sidewalls, and tailgates.
- Covering the cargo beds of haul trucks to minimize wind-blown dust emissions and spillage.

Noise and Vibration

- Appropriate level of sound attenuation would be used or constructed to meet local ordinances. Potential sound attenuation measures that could be considered include, but are not limited to, temporary sound barriers near the noise source, such as those considered in the effects analysis relative to Best Available Control Technology for stationary/quasi-stationary equipment, or otherwise placed between the source(s) of construction noise and noise-sensitive receptors, as appropriate.
- Contractor would be responsible for maintaining equipment to comply with noise standards (e.g., exhaust mufflers, acoustically attenuating shields, shrouds, or enclosures).
- If necessary, hoppers, conveyor transfer points, storage bins, and chutes would be lined or covered with sound-deadening material.

4.5.2 Mitigation Measures

Vegetation, Wildlife, Fisheries, and Special Status Species

For Alternative 3-Floodplain Terrace Plan no compensatory habitat mitigation is proposed because of the environmentally sustainable design approach to flood risk management features in the Truckee Meadows reach, particularly in regards to revegetation of floodplain terraces with native riparian vegetation and, to the extent possible, implementation of bioengineering techniques in the scour protection features.

For Alternative 2-Detention Plan habitat lost in the Truckee Meadows reach would be compensated by establishing Emergent Wetland/Marsh (9.8 acres), Native Riparian Forest (12.6 acres), Willow/Mixed Willow Scrub (33.2 acres), Upland Native Herbaceous/Shrub/Grassland (5.7 acres), and 14.3 acres of other wetlands/waters of the U.S., within the Truckee Meadows area.

Land Use, Agriculture, and Prime and Unique Farmland

TRFMA would be responsible for securing all lands, easements, and rights-of-way necessary for construction and operation of the project. Project lands are typically secured by purchase of fee title or purchase of easements. TRFMA would ensure that all necessary land use designation changes would be implemented as regulated by the responsible local, state, and Federal planning policies.

- Lands required by the proposed project would be purchased and owners would be compensated at fair market value for the lands.
- Negotiation of temporary easements necessary for construction would include fair compensation for loss of use experienced by the landowner during that time period.
- Once construction is completed for each contract, the temporary easement and staging areas would be restored and returned to pre-project conditions and uses.
- Coordination would continue with TMWA to ensure that no water treatment capabilities are lost at the Glendale Water Treatment Facility as a result of this project.
- Negotiation of temporary easements necessary for construction would include fair compensation for loss of agricultural production experienced by the landowner during that time period. Construction of project features would be phased by construction contract. Once construction is completed for each contract, the temporary easement and staging areas would be restored and returned to pre-project conditions and uses.

4.6 OPERATION AND MAINTENANCE

TRFMA would be responsible for operation and maintenance (O&M) of the project once completed. The O&M responsibilities would include operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of the completed project. The maintenance for flood control features (levees, channels, flood control structures and bank protection) and recreation would be performed in accordance with provisions of 33 C.F.R. §208.10, Local flood protection works; maintenance and operation of structures and facilities. This requires, in general that "The structures and facilities constructed by the United States for local flood protection shall be continuously maintained in such a manner and operated at such times and for such periods as may be necessary to obtain the maximum benefits." (33 C.F.R. §208.10(a)). Also, for any proposed modifications to Federal flood project features, USACE must review and approve any modifications, as provided in 33 U.S.C. § 408.

The Operation and Maintenance Manual for the existing Truckee River and Tributaries Project would be modified to be compatible with the new project. Because the Recommended Plan would completely replace the existing Truckee River and Tributaries Project between Glendale Avenue and Vista, the sponsor for the Truckee Meadows Flood Control Project would be responsible for OMRR&R of all project features in that reach. The GRR recommends deauthorization of the Glendale Avenue to Vista Reach of Truckee River and Tributaries Project to ensure that the sponsor for the Truckee Meadows Flood Control Project has full and clear responsibility, as between USACE and the sponsor, for OMRR&R of all USACE flood risk management elements between Glendale Avenue and Vista. The State of Nevada would no longer be required by USACE to maintain that portion of the existing Truckee River and Tributaries Project. OMRR&R responsibilities for the parts of the Truckee River and Tributaries Project upstream of Glendale Avenue or downstream of Vista would be not be changed by the Recommended Plan. Between U.S. Highway 395 and Glendale Avenue, the river channel is currently maintained by the Carson-Truckee Water Conservation District (CTWCD) and would not be modified by the Recommended Plan. The only Recommended Plan feature in that approximately 2,700-foot segment is the Reno-Sparks Indian Colony floodwall/levee that has already been constructed and is proposed for Section 104 credit. The new floodwall/levee did not significantly modify the river channel or left (north) bank. Therefore, CTWCD will continue to maintain the river channel and banks riverward of the permanent levee easement for the Reno-Sparks Indian Colony floodwall/levee.

USACE schedules and conducts joint acceptance inspections, monitors correction of deficiencies, schedules and monitors O&M training, ensures that all as-built drawings are complete and accurate, and

provides information/support for USACE to prepare and distribute property transfer documentation.

Prior to the District Engineer providing notice of the determination that the entire project, or a functional portion of the project, is complete, pre-final inspections will be conducted on an area-by-area basis or may be conducted on a functional basis. The purpose of these inspections is to ensure a complete, functional, and maintainable project (or portion of a project), constructed fully in accordance with the contract specifications and drawings. When the District Engineer determines the project, or a functional portion of the project, is complete, USACE will prepare and furnish an O&M manual for the project or functional project features and TRFMA will assume O&M responsibilities.

4.6.1 Flood Risk Management Features

For the Truckee Meadows reach, operation and maintenance is required for floodwalls, levees, interior drainages, relief wells, seepage remediation and bank protection. The requirements include inspecting and maintaining the floodwalls and interior drainage features regularly and inspecting and maintaining levees and keeping them free from vegetation growth that could reduce reliability. Inspections and maintenance activities near the Reno-Tahoe International Airport must be coordinated in advance. The bank protection would be inspected annually prior to flood season and maintained in accordance with the O&M agreement.

The following practices currently used on California levees related to pesticide (rodenticide) were included for cost estimating purposes:

- Rodent control will include baiting and burrow repair.
- A combination of bait stations and broadcast spreading for rodents, mainly ground squirrels will be used
- Cost estimates were based on the use of anti-coagulant rodenticide applied to rolled oats.

All best management practices for both weeds and burrowing animals will be revisited during PED to ensure that the most up to date practices are used to minimize effects to non-target wildlife. An integrated pest management plan would be developed using a variety of control methods to provide safe and effective control.

Access for O&M activities would be provided by a 10-foot-wide maintenance road located on the levee crest or landside of floodwalls. See the Basis of Design Appendix to the GRR for more information. During floods, the levees and floodwalls would be patrolled continuously to locate possible boils or unusual wetness that signals a problem in the structure.

The vegetation on the floodplain terraces will require a 3 to 5 year establishment period consisting of weed control and irrigation. This maintenance would be required through contract award for three to five years following completion of construction. At the end of the three to five year term, the areas would be turned over to the local sponsor. The local sponsor would need to perform periodic weed control to prevent noxious weeds from taking hold. The local sponsor would also need to remove garbage on a periodic basis for the purpose of maintaining public health and safety. Gates, locks and signs would need to be kept in functional order.

Control of noxious weeds will be a major focus of the maintenance of the floodplain terraces. Prior to turnover of the floodplain terraces to the Non-federal sponsor, during the installation and establishment period aggressive control of weeds will be performed through timed mowing, broad application of selective and nonselective herbicides, spot spraying and hand pulling of weeds. After the establishment period when native vegetation has become established and can significantly suppress

noxious weeds the same weed control methods will be used but on a more infrequent basis. The vegetation targeted for the floodplain terraces should provide a cover of woody vegetation that shades out the main weed of concern, tall white top. Annual broadcast treatment of trouble spots, spot spraying and hand pulling of individual weeds would be required.

4.6.2 Recreation Features

Upon transfer at completion of construction, the operation and maintenance of the recreation features of the project becomes the responsibility of TRFMA. The new trails, trailheads, fishing access, kayak , boat launch sites and appurtenant landscaping, gates, signs, parking lots, driveways and restrooms will require maintenance to maximize project recreation benefits. A separate O&M manual would be developed for project recreation features.

CHAPTER 5. AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES AND MITIGATION

5.1 INTRODUCTION

This chapter describes the existing environmental resources in the area that would be affected if any of the alternatives were implemented and describes the environmental consequences of the alternative plans on those environmental resources. A description of the existing conditions is presented in the Affected Environment section of each resource. Potential effects of project alternatives to the resource are discussed in the Environmental Consequences section. Mitigation measures identified to avoid, minimize, or compensate for adverse project effects on a resource are discussed in the Mitigation Measures section. Further explanation on how these sections were developed follows.

5.1.1 Affected Environment

For each resource, this section describes the existing pre-project conditions of the environmental resource in the project area. Resources not evaluated in detail are described first, followed by the resources that may be significantly affected by the alternatives.

Although all conditions are subject to some change over time, most of these resources are not expected to change significantly under the without project condition over the 50-year period of analysis for this study. However, any changes expected in the future-without-project condition are described as part of the No Action alternative in the Environmental Consequences section. The analysis of effects described in the Environmental Consequences sections uses the pre-project condition as its baseline to identify changes to the resource under future with- and without-project conditions.

5.1.2 Environmental Consequences and Mitigation

In the evaluation of environmental consequences, the conditions described for each resource are compared with future conditions with each alternative plan in place. As appropriate, the effects are discussed either by the reaches used in Chapter 3 or for the study as a whole. This is because the effects of several of the resources are realized over the entire project area, rather than limited to a specific part of the project area.

Under NEPA, the effects of the proposed action and alternatives under consideration, including the no-action alternative, are determined by comparing effects between alternatives and against effects from the no-action alternative. Under NEPA, the no-action alternative (i.e., expected future conditions without the project) is the benchmark to which the action alternatives are compared, and the no-action alternative is compared to existing conditions.

Both adverse and beneficial effects are considered, including direct effects during construction and indirect effects resulting from the alternatives. Each section, where appropriate, contains a discussion of the methods used to analyze effects. In addition, significance criteria for each resource are used to evaluate the level of significance of any adverse effects. Finally, measures are proposed to avoid, minimize, or mitigate (compensate) any significant adverse effects for each resource. A summary of the effects and significance is included in Table S-2 of the Summary.

The significance criteria are based on the definition of “significantly” under NEPA. 40 C.F.R. §1508.27. "Significantly" as defined in NEPA requires considerations of both context and intensity:

(a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant. 40 C.F.R. §1508.27(a).

(b) Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

1. Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

2. The degree to which the proposed action affects public health or safety.

3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.

5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

10. Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment. 40 C.F.R. §1508.27(b).

5.2 ENVIRONMENTAL CONDITIONS NOT EVALUATED IN DETAIL

Following preliminary assessment of environmental resources in the project area, the following environmental conditions are not discussed in detail because the project would have minimal to no effect

on them: climate and precipitation; hazardous, toxic and radiological waste; geology; soil types and properties; and seismicity and faulting. A discussion of these environmental conditions and the explanation for the determination of minimal to no effect on each follows.

5.2.1 Climate and Precipitation

Climate in the project area is semiarid to arid. Summers are characterized by clear, warm days and cool nights. Winters are not severe, with temperatures rarely dropping below zero degrees Fahrenheit. The highest temperature recorded at Reno was 108 degrees Fahrenheit (July 2002); the lowest temperature on record was –19 degrees Fahrenheit (January 1890). The average August temperature is about 70 degrees Fahrenheit; the average January temperature is about 33 degrees Fahrenheit (Interior & State, 2004).

The entire watershed is situated within the rain shadow imposed by the Sierra Nevada crest, with aridity becoming more pronounced along a gradient progressing eastward. The Truckee River basin above the Reno/Sparks metropolitan area is characterized by severe winters and short, mild summers. The climate within the Truckee Meadows area is generally dry and semiarid.

Precipitation is markedly less than on the adjacent western slopes of the Sierra Nevada mountain range. Most precipitation occurs between late October and early May in the form of snow. Normal annual precipitation over the drainage area between Lake Tahoe and Vista varies from 8 to 70 inches, with a basin mean of 26.5 inches. The mean annual precipitation for the city of Reno is 7.5 inches. Precipitation in the form of snow falls from December to March above elevation 5,000 feet; however, some storms produce rain up to the highest elevations of the basin. Total snowfall for the city averages 25 inches per year, but snow pack seldom remains for more than three to four days.

Global Warming and Climate Change

Northwestern Nevada

Scientists have warned that climate change due to global warming could dramatically affect the environment. To examine recent temperature patterns in the U.S., the U.S. Public Interest Research Group (U.S. PIRG) compared temperature data for the years 2000-2006 from 255 weather stations located in all 50 states and Washington, D.C., with temperatures averaged over the 30 years spanning 1971-2000. The U.S. PIRG found that temperatures overall were above the 30-year average across the nation (Cassady and Figdor, 2007).

The U.S. PIRG found that Nevada was among the states with the most dramatic increases in average temperatures in the last 30 years, including an average increase in Reno of 3.4 degrees above the average. This was the second highest reading in the nation for the period. U.S. PIRG also found that the average temperature in Reno from June through August of 2006 was almost seven degrees above the 30-year average, the highest increase in the nation.

Such rising temperatures would affect the annual amount of snow in the northern Sierra Nevada. Leading scientists agree that a rise in temperature could result in a 36 percent reduction of Sierra snow in 50 years (Sierra Nevada Alliance, 2005). Since nearly all of the water to northwest Nevada is supplied by the snowmelt from the Sierra Nevada, this area could find itself unable to meet the current and future water demands of its urban population and farmers, especially during the summer months (Sierra Nevada Alliance, 2005).

The Reno, Carson City, and Minden/Gardnerville areas of Nevada all are dependent on Sierra Nevada waters (Timmer, 2003). With respect to the Truckee River, the increase in temperatures and

decrease in annual snowmelt imply that water releases from upstream storage reservoirs will have to be extended over a longer period. This change also implies that those river systems without significant main-stream storage facilities (Carson, Walker, and Humboldt Rivers) will be more prone to flooding and early runoff, with the possibility of a shortened irrigation season for agriculture.

In 2006, TMWA partnered with the Desert Research Institute (DRI) to research the possibility of global warming and climate affecting the Truckee Meadow's water supplies. DRI concluded that relationships between climatic and hydrologic variables were inconclusive at that time due to the high variability of the parameters, and trends could not be detected over the period of record that indicated an effect on the region's water resources or supplies. They also concluded that additional research is needed to continue to refine the current level of understanding of climatic change and to evaluate the latest data for trends (TMWA, 2007).

USBOR is currently conducting a comprehensive study to define options for meeting future water demands in the Truckee River Basin. The study will identify potential climate change impacts to the Truckee's hydrology including fish and wildlife, their habitats, hydroelectric power generation, water quality, recreation, and flood control. USBOR is working with the Placer County Water Agency, Tahoe Regional Planning Agency, DWR, State of Nevada Department of Water Resource Planning (NDWRP), TMWA, City of Fernley, and the PLPT.

USACE Policy

Water resources management agencies at all levels of government, including USACE, must deal with the consequences of climatic variations as seen in the current records of atmospheric temperatures, sea level rise, and hydrological and meteorological trends.

USACE does not collect or interpret the basic scientific and physical information – precipitation, evaporation, snow pack, wind speed, soil moisture, or sea level – that explain climate change trends. However, the agency's mission does involve understanding and responding to the extremes of climate variability, including protecting the public from the effects of floods and droughts, and helping to sustain aquatic ecosystems by sustaining ecological streamflows and by restoring aquatic environments (USACE, 2007b).

For the Truckee Meadows project, USACE is addressing climate change by (1) incorporating risk and uncertainty analyses into the planning process and (2) designing the features of the project to allow for projected long-term changes in Sierra Nevada snowmelt. USACE is also working closely with other Federal, State, and local agencies to ensure that the project is operated in a more sustainable nature to allow greater flexibility with shifts in climatic trends. As a result, it is anticipated that the project would have minimal to no direct or indirect effect on climate change.

5.2.2 Hazardous, Toxic, and Radiological Waste

USACE performed an Environmental Site Assessment during May 2011 from downtown Reno to Pyramid Lake (USACE, 2011). The site assessment identified numerous sources of possible contamination due to hazardous, toxic, or radiological waste (HTRW) during a records search and field survey. The data search showed 686 sources of potential contamination within one mile of the study boundaries. The breakdown of these sources follows:

- 190 state-registered underground storage tanks (UST) and above-ground storage tanks (AST)
- 186 listed generators of hazardous waste regulated by the U.S. Environmental Protection Agency (USEPA)

- 207 facilities required to report their hazardous waste activities to the USEPA
- 13 leaking UST's since cleaned up or undergoing remediation
- 59 sudden or accidental releases of hazardous substances into the environment
- 14 non-UST active corrective action cases
- 15 pesticide-producing establishments and compliance activities
- 1 mine
- 1 coal/gas site
- 3 sites on the PCB database

Of the potential sources identified in the data search, 26 of them were located within the construction zone of the project. The breakdown of these potential sources is as follows:

- 6 state registered UST's and AST's
- 10 sites that had leaking UST's but have since been cleaned up or are undergoing remediation
- 1 hazardous chemical-producing establishment and compliance activities
- 9 sites which transport, store, treat, and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA).

The Sparks Solvent/Fuel Site (former railroad fueling/storage site) is in the vicinity of the project and was listed as a Superfund site under the Comprehensive Environmental Response, Compensation, and Liability Act. However, it has been removed from the Superfund list with ongoing remediation activities in place. This site is just under a mile north of the potential project construction area.

There is no indication that these potential sources will affect activities within the construction zone of this project. For the majority of the sources, no field evidence or records were found to indicate that these potential sources have caused significant contamination. Most involve registered UST's, hazardous waste generators, minor tank leaks, UST removal and remediation, and minor accidental releases. The Environmental Site Assessment will be updated before construction activities begin, including coordination with appropriate environmental agencies. Based on information gathered during the database search and site visit, the feasibility level project design avoids the identified potential HTRW sources, including underground storage tanks.

If any evidence of potential HTRW is found during construction, all work would cease, and USACE and TRFMA would be notified for further evaluation of the potential contamination. Any unanticipated hazardous materials encountered during construction would be handled according to applicable federal, state, and local regulations. USACE would require that a contingency plan that outlines steps to be taken before and during construction activities to document soil conditions, as well as procedures to be followed if unexpected conditions are encountered, be prepared by the contractor. TRFMA is responsible for 100 percent of the cost to develop the clean-up procedures (remedial action plan) and to remediate any hazardous substances, pollutants, or contaminants (ER 1110-2-1150)[5].

[5]The Corps will not participate in clean up of materials regulated by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or by the Resource Conservation and Recovery Act (RCRA). Assessments during the feasibility phase to determine the nature and extent of such materials within the project area shall be cost shared. The cost of cleanup of materials not covered by CERCLA and RCRA will be considered when determining if the proposed project is justified (ER 1105-2-100).

5.2.3 Geology

Geology

The Truckee River originates in the Sierra Nevada Range, a west-tilted fault block that is dominated by intrusive granitic rocks that are Mesozoic in age. After flowing through the granitic rocks of the Sierra Nevada Range, the Truckee River flows into the Truckee Meadows near Reno. At this location, the Truckee River enters the Great Basin section of the Basin and Range physiographic province. This area is characterized by north-south trending fault-bound mountains that are separated by alluvial valleys (USGS, 2005).

The term "Truckee Meadows" generally refers to the broad basin that is bounded by the Virginia Range on the east, the Carson Range on the west, Steamboat Hills on the south, and the eastern portion of the uplifted Peavine block on the north. The Truckee River flows eastward out of Truckee Meadows and flows through the Virginia Range from Vista to Wadsworth via the Truckee Canyon. The walls of the Truckee Canyon consist primarily of Tertiary-age volcanic rocks. Lacustrine deposits formed in glacial Lake Lahontan during Quaternary time extend up the canyon to approximately Rainbow Bend. Glacial outwash deposits have been mapped as far downstream as Mustang (Bell and Bonham, 1987).

Near Wadsworth, the Truckee River abruptly turns northward, flowing through a broad alluvial valley that is bounded by Quaternary-age (Pleistocene) lacustrine deposits of Lake Lahontan and Tertiary-age volcanic rocks. Between Dead Ox Wash and Numana Dam, the river flows through a narrow canyon formed in the lacustrine sediments. At Numana Dam, the river enters an alluvial valley, which it flows through until Marble Bluff Dam, where it enters an incised valley bounded by Quaternary-age deltaic deposits of Lake Lahontan (USGS, 1999).

Geologic features in the project area are found throughout the region. Since the proposed project would consist of flood risk management and recreational improvements, it is expected that the proposed project alternatives would not affect the geologic conditions in the project area.

Vista Narrows

The Truckee Meadows was formed as a graben (depressed block of land bordered by parallel faults) with basin-and-range faults on the east and west sides. The west-dipping rocks of the Virginia Range form the eastern boundary, and the active tilting has lead to a relative uplift of the Virginia Range with respect to the valley floor (meadows).

Exposed Virginia Range bedrock in this area (a series of outcrops along the channel bottom over the distance of several miles near Vista, known today as the Vista Narrows) is relatively non-erosive and thus forms a rising base level relative to the meadows due to uplift (Cities of Reno and Sparks, 2007). The Truckee River flows across the relatively flat, but slowly rising, meadows into and through the narrow, bedrock-controlled canyon in the Virginia Range. The abrupt movement of the river into the confined bedrock promotes pooling of stream flow, especially during larger floods, at the eastern end of the meadows.

In the early 1960s, USACE implemented a large-scale flood control project along the middle and lower Truckee River, which channelized the natural river channel and removed a large section of the Vista Narrows. The purpose of these activities was to convey greater flow volumes during flood peaks to reduce the flooding hazard to urban areas in the Truckee Meadows and other areas along the river.

The proposed alternatives would not involve any reshaping of the Vista Narrows. Therefore, the

proposed project alternatives would not affect the geologic condition in this area.

5.2.4 Soil Types and Deposits

In general, soil types of the Sierra Nevada Province are present in the upper watershed while soil types of the Great Basin are present in the lower watershed. All soils in the Truckee River Basin are predominantly loamy to sandy with intermixed gravels and boulders. Soils range from excessively drained on steep slopes in the upper watershed to poorly drained in the flat basin areas (Otis Bay, 2004).

Soils types in the project area are typically classified as ultisols, aridisols, and entisols. Ultisols are highly weathered, lightly acidic soils, which developed under forested conditions in the upper watershed. Aridisols are dry, alkaline mineral soils with light-colored surface horizons that contain limited organic material. Aridisols typically have calcium carbonate, gypsum, and other salts accumulated on its subsurface. They usually occur in the lower watershed, where there is less precipitation. Entisols are dry mineral soils that are commonly formed on alluvial material. Entisols are present in both the upper and lower watersheds (Otis Bay, 2004).

Late Pleistocene Donner Lake and Tahoe glacial outwash deposits underlie the Downtown Reno and Truckee Meadows reaches. The Donner Lake outwash deposit ranges from about 30 feet at the west end of the basin to over 330 feet eastward and overlays the bedrock under Reno. The Tahoe glacial outwash deposit lies above the Donner Lake outwash. Similarly, the Tahoe outwash ranges in thickness from about 300 feet under the western part of Reno to over 1,000 feet beneath Sparks. The Truckee River has reworked the top portion of the outwash and deposited the material along the modern floodplain of the river, overlying earlier glacial outwash. Both types of glacial outwash deposits contain boulders as large as 16 feet in diameter. Floodplain and lacustrine deposits overlie portions of the outwash. The floodplain materials are primarily clayey silt, silt, and silty sand with interstitial lenses of either peat or clay-rich sediments (Otis Bay, 2004)

In general, along the Lower Truckee River watershed, older, more stable alluvium present along the Truckee River corridor was deposited during the Pleistocene. The Reno and Verdico soil types were developed on this older alluvial material. Soils such as Hunewell, Perazzo, Notus, Truckee, and Voltaire have developed on more recent alluvium. The Sagouspe series formed in sandy alluvium along the Truckee River floodplain. Saralegui soils are formed in the loamy alluvium on high terraces. Patna and Isolde soils, also occurring on high terraces, formed from eolian sand deposits (Otis Bay, 2004). Because of the size and extent of soil resources in the project area, it is expected that the proposed project alternatives would not affect the soil types and regional soil deposits in the project area.

5.2.5 Seismicity and Faulting

The Truckee River Basin is located in the transitional zone between the Basin and Range and the Sierra Nevada Provinces. The structural geology of the Basin and Range are a result of tensional and compressional forces. Tensional forces result when the earth's upper crust stretches. Compressional forces are caused by major strike-slip faults and associated wrench-faults, a type of strike-slip fault that is formed by horizontal compressive forces acting within the earth's crust (Otis Bay, 2004).

Areas underlain by glacial outwash and mainstem deposits of the Truckee River are believed to be potentially unstable and subject to slumps or ground disturbances along steep cuts or embankments during a major seismic event. Areas underlain by floodplain and lake deposits are subject to liquefaction, severe ground motion, and surface dislocation. This is especially dangerous in areas of groundwater discharge or where the soils are saturated.

Two major fault systems are responsible for most of the seismic activities in western Nevada. The Sierra Nevada Frontal System is an irregular zone of major and secondary faults extending from the Garlock Fault northward along the east side of the Sierra Nevada Range for more than 400 miles. A second major zone, possibly related to the Frontal system, is the 118 Meridian Zone that trends southwest of Winnemucca to at least Owens Valley. A map of known faults in and near the project area is included in Figure 5-1.

The Reno area is considered to be seismically active. The city lies between the Sierra Nevada Frontal System and the 118 Meridian Zone. The Northwest Reno Fault Zone ("nrfz" on Figure 5-1) crosses the Truckee River near the middle of the downtown Reno reach. Quaternary faults that trend due north are common and widespread northward through Reno and in the Mount Rose fan complex northwest of Steamboat Hills. Nearly all the faults are normal faults, and displacement along these faults varies from a few feet to approximately 50 feet.

Historically, the severe earthquakes in the area include those with magnitudes of 6.0 and 6.4 that occurred just south of Reno in 1914. The first had an intensity of VII (Modified Mercalli Scale) in the Truckee Meadows area. An additional two earthquakes, both of magnitude 6.0, occurred near Virginia City and Verdi in 1869 and 1948, respectively. In 1966, a quake of 5.7 was centered north of the town of Truckee. In all, from 1940 to 1970, approximately 70 earthquakes with magnitude 4.0 or greater have occurred within a 62-mile radius of Reno.

In the Truckee Meadows reach, the Truckee River flows across a northwest trending fault zone and its associated structural trough that extends from the southern end of the meadows to the northern edge of Spanish Springs Valley. The western edge of the Spanish Springs Peak Fault Zone ("sspfz") lies within the Truckee Meadows reach due north of the confluence of Steamboat Creek and the Truckee River. The fault zone has an estimated earthquake magnitude of 6.6 and runs in a southwest to northeast direction (Nevada Seismological Laboratory, 2003). It is located in the vicinity of the sewage facility.

The Eastern Reno Basin Fault Zone ("erbfz") crosses the Truckee River in the Truckee Meadows reach. The northern edge of the fault zone is located on the north side of the river, just east of Sparks. The Eastern Reno Basin Fault Zone ("erbfz") has an estimated earthquake magnitude of 6.9 (Nevada Seismological Laboratory, 2003). The fault zone runs in a north to south direction, from just north of the Truckee River south to NV Highway 341. The Northern Virginia Range Fault ("nvrf") is located south of the Truckee River, west of Steamboat Creek. The Northern Virginia Range Fault has an estimated earthquake magnitude of 6.6 (Nevada Seismological Laboratory, 2003).

As the Truckee River enters the Virginia Range, it is controlled by the presence of Walker Lane. Walker Lane is a structural lineament containing northwest-trending faults that extend from the eastern edge of the Virginia Range to Pyramid Lake. There are two fault zones located north of the Truckee River in the Lower Truckee River reach (Nevada Seismological Laboratory, 2003). Most of the Spanish Springs Peak Fault Zone and the Olinghouse Fault Zone ("ofz") are located in the Lower Truckee River reach. The Olinghouse Fault Zone has an estimated earthquake magnitude of 7.1 (Nevada Seismological Laboratory, 2003). Both faults have a southwest to northeast orientation.

The Pyramid Lake Fault Zone ("plfz") spans the majority of the western edge of Pyramid Lake and extends in a southeast direction, south of Fernley, just west of Interstate 85. The fault zone crosses the Truckee River at Wadsworth, the southern boundary of the lower Truckee River reach. The Pyramid Lake Fault Zone has an estimated earthquake magnitude of 7.3 (Nevada Seismological Laboratory, 2003).

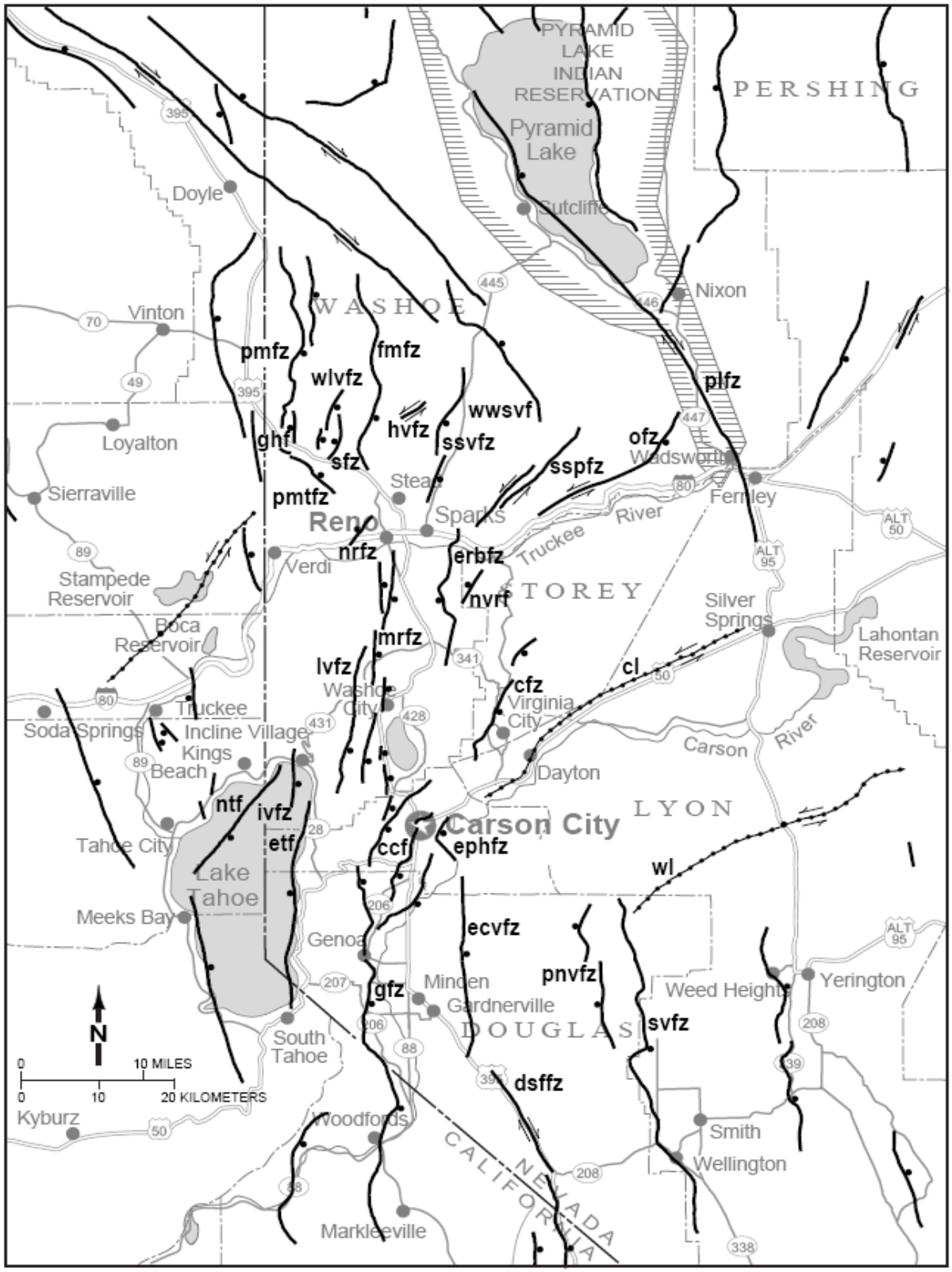


Figure 5-1. Known Faults near the Truckee Meadows Area.

Since the proposed project would consist of flood risk management and recreational improvements, it is expected that the proposed project alternatives would not affect seismicity and faulting conditions in the project area. All proposed project features would be constructed in accordance with any relevant requirements or codes related to earthquake safety in the project area.

5.2.6 Water Resources and Supply

Surface runoff of precipitation is the primary source of water supply in the Truckee River Basin, with groundwater being the remaining source. Most of the available Truckee River water supply in the basin is generated upstream of the U.S. Geological Survey (USGS) stream gage at Farad, California. Most of the supply of the Truckee River is generated during the spring runoff season (April to July) as the snow pack in the Sierra Nevada melts. This runoff flows via tributaries into the Truckee River, the major source of surface water for the project area. Because the climate of the Truckee River Basin is characterized by cycles of flood and drought, precipitation and runoff vary widely from year to year.

Surface Water

Upper Truckee River Basin and Lake Tahoe

From Lake Tahoe, the Truckee River flows generally north and east through California for about 40 miles and enters Nevada near Farad. The drainage area from Lake Tahoe Dam to Farad is 426 square miles. The main tributaries are Donner, Martis, and Prosser creeks and the Little Truckee River, all of which are regulated by dams. The unregulated drainage area covers 146 square miles and produces 30 percent of the average annual runoff at Farad (Interior and State of California, 2008).

Donner Creek drains an area of 30 square miles, enters the Truckee River about 14 miles downstream from Lake Tahoe Dam, and contributes 26,300 acre-feet annually. Martis and Prosser creeks join the Truckee River about seven miles downstream from Donner Creek, with drainage areas of 20 and 50 square miles, respectively. Martis Creek's annual discharge averages 19,700 acre-feet; Prosser Creek's annual discharge averages 64,000 acre-feet annually (Interior and State of California, 2008).

The Little Truckee River is the largest tributary to the Truckee River, with a drainage area of 173 square miles. It enters the Truckee River about four miles upstream of Farad. Tributaries to the Little Truckee River are Independence, Sagehen, and Davies creeks. Annual average discharge is 135, 000 acre-feet. Downstream from Farad, principal tributaries are Dog Creek and Hunter Creek, which have average annual runoffs of 4,500 and 7,000 acre-feet, respectively (Interior and State of California, 2008).

Reno and Truckee Meadows

The Truckee River has been developed as the primary water source for the Reno/Sparks metropolitan area. The principal municipal water diversions for the Reno/Sparks area are at TMWA's Chalk Bluff Water Treatment Facility (immediately upstream of West McCarran Boulevard), and Glendale Water Treatment Facility (immediately downstream of Glendale Avenue).

Within the Truckee Meadows, Steamboat Creek drains an area of 244 square miles and contributes about 15,500 acre-feet annually to the Truckee River. Tributaries to Steamboat Creek are Galena, Evans, Thomas, and Whites creeks. The 600-square-mile drainage area downstream from Truckee Meadows to Pyramid Lake provides only minimal contributions to the Truckee River water supply (Interior and State of California, 2008).

Steamboat Creek also carries the treated effluent from TMWRF and return flows from numerous irrigation ditches into the Truckee River. The most important of these ditches are Steamboat Ditch, Last Chance Ditch, and Lake Ditch, as well as the Boynton Slough (which receives water from Cochran

Ditch). The TMWRF is the largest point source for surface water into the river and Steamboat Creek is a major non-point source, contributing almost as much nitrogen to the Truckee River as TMWRF (see Section 5.5 for further discussion).

Lower Truckee River and Pyramid Lake

Downstream from Truckee Meadows, there are numerous diversions from the Truckee River, including several on the Pyramid Lake Paiute Reservation. The largest diversion on the Lower Truckee River is Derby Dam, where water is diverted into the Newlands Project via the Truckee Canal. The 32-mile canal provides irrigation water to lands near Fernley and Hazen in the Truckee Division and to Lahontan Reservoir for use in the Carson Division, on the Fallon Indian Reservation, and on the Stillwater National Wildlife Refuge. From 1967 to 2000, the average annual discharge from the Truckee Canal as measured at the USGS gage station near Wadsworth was 161,500 acre-feet. Maximum Newlands Project agricultural demands include 18,520 acre-feet in the Truckee Division and 275,700 acre-feet in the Carson Division (Interior and State of California, 2004).

The terminus of the Truckee River is Pyramid Lake. The saline lake, located within the Pyramid Lake Paiute Reservation, is approximately 25 miles long, ranges from four to 11 miles wide, and covers approximately 108,000 acres at a surface elevation of 3,800 feet mean sea level. At this lake-surface elevation, the lake has a maximum depth of 350 feet and contains approximately 21 million acre-feet of water.

Upstream Water Storage

The Truckee River is the major source of surface water in the Truckee Meadows. The River provides a highly variable flow that requires upstream storage for downstream uses and flood management. Lake Tahoe and six other reservoirs on the Truckee River regulate the flow of the river. The surface storage locations and regulated storage capacities (including flood control storage) are as listed below (Interior and State of California, 2008) and shown on Figure 1-1:

- Lake Tahoe: 744,600 (same) acre-feet (this is the amount of regulated storage in the top 6 feet of the lake).
- Donner Lake: 9,500 (6,610) acre-feet.
- Martis Creek Reservoir: 20,400 (same) acre-feet.
- Prosser Creek Reservoir: 28,800 (20,000) acre-feet.
- Independence Lake: 17,500 (3,000) acre-feet.
- Stampede Reservoir: 226,500 (22,000) acre-feet.
- Boca Reservoir: 41,100 (8,000) acre-feet.

Much of the water originates downstream of Lake Tahoe, which provides about 70 percent of the available storage on the Truckee River system. As a result, the remaining 30 percent of the storage must be used to regulate about 70 percent of the river's flow at Farad (Washoe County, 2010b). As noted above, Truckee River flows below Lake Tahoe can be highly variable. In wetter years there is more water stored in the reservoirs while in dryer years the water is typically sent downstream to maintain flows.

Groundwater

Except for the Pyramid Lake Valley, the Truckee Meadows area is the major groundwater basin in the Nevada portion of the Truckee River drainage. An estimated 450,000 acre-feet of groundwater is

present within 100 feet of the surface in the Truckee Meadows area and groundwater provides approximately 15 percent of the water needs in the Truckee Meadows area (TMWA, 2005). Low-yield, private wells serve individual residences throughout the Truckee River basin. Most groundwater extraction occurs in the Truckee Meadows, where municipal water purveyors, such as TMWA, operate production wells to supplement the surface water supply (Interior and State of California, 2008). While TMWA's customers primarily receive water from TMWA-provided surface water supplies, customers served by the Washoe County Water Resources Department primarily use groundwater and receive supplemental surface water supplies from the County. The County's Department of Water Resources also has rights to and purveys groundwater. Sun Valley has its own water purveyor but it is much smaller than either the County Department of Water Resources or TMWA.

The groundwater resources of the basin are closely related to the surface water resources because recharge of the groundwater supply comes mostly from surface water. Estimated groundwater recharge in Truckee Meadows is 29,000 acre-feet per year and comes from infiltration of precipitation (mainly snowmelt); return flows from surface water supplies used for irrigation; and seepage from ditches, canals, and streambeds (Interior and State of California, 2008).

The total permitted, certificated, and vested groundwater rights recognized in Truckee Meadows by the State Engineer's Office are 79,765 acre-feet per year, or about 50,000 acre-feet per year more than the perennial yield. TMWA holds certificated and permitted groundwater rights in Truckee Meadows to divert up to 41,811 acre-feet per year (Interior and State of California, 2008). However, through a conjunctive use agreement TMWA is limited to pumping only 22,000 acre-feet in a drought year (TMWA, 2009).

Several soil exploration programs were conducted in the following regions of Truckee Meadows: Steamboat Creek/Huffaker Hills, Boynton Slough, UNR Farms, East Meadows, and West Meadows. The areas in each region and the locations of explorations within these areas are described in detail in USACE' Geotechnical Report (Attachment D to the Basis of Design Appendix of the GRR, USACE 2010). The following is a summary of groundwater depths at some of the boring sites in the Truckee Meadows:

- Steamboat Creek: approximately seven feet to groundwater
- Huffaker Hills: approximately 10 feet to groundwater
- UNR Farms: approximately 7 feet to groundwater
- East Meadows: approximately 12 to 21 feet to groundwater
- West Meadows: approximately 10 feet to groundwater

The Truckee River is a "gaining stream" between the flow gages at Wadsworth and Nixon during low to moderate flows. A gaining stream is a stream reach in which the water table adjacent to the stream is higher than the water surface in the stream, causing groundwater to seep into the stream, increasing its flow. The Truckee River receives approximately 11,000 acre-feet per year of groundwater between Wadsworth and Nixon. The sources of groundwater inflow are the western Dodge Flat basin, Fernley flow system, and Dead Ox Wash area (DRI, 2002).

Water Supply Management

Water Rights

The right to use Truckee River water is referred to as a "water right." Water in the State of

Nevada is allocated according to the doctrine of prior appropriation ("first in time, first in right"). According to Nevada law, Truckee River water rights used for irrigation remain with the property, unless specifically reserved by deed, or previously sold and removed from the property. In some locations in Reno, Sparks, Washoe and Storey Counties, these water rights still remain attached to the property, although decades have often passed since the land was used for agriculture. Water rights previously used for irrigation are now owned by TMWA for supplying municipal and industrial water to the region (TMWA, 2005).

Laws, Decrees, and Agreements

Numerous laws, court decrees, and agreements govern the current operation of reservoirs in the Truckee River basin (Interior and State of California, 2008). Some of the key operating constraints on the river are the Truckee River General Electric Decree, Orr Ditch Decree, which incorporated the Truckee River Agreement, and the Tahoe-Prosser Exchange Agreement. The Operating Criteria and Procedures (OCAP) regulate operations on the Newlands Project.

The Truckee River General Electric Decree set forth the operating constraints for Lake Tahoe, granted the USBOR the right to use Lake Tahoe Dam to regulate streamflows for the Newlands Project, and established the original Floriston Rates (later modified by the Truckee River Agreement). The Floriston Rates provided a minimum flow in the river of 500 cfs from March through September and 400 cfs the remainder of the year, as long as water was available in Lake Tahoe. The Floriston Rates were intended to provide sufficient streamflow for a pulp and paper mill near Floriston, California, and the four run-of-the-river hydroelectric plants. At the time of the Truckee River General Electric Decree, Floriston Rates were measured at the Iceland, California stream gage, located approximately one mile upstream of what is now Floriston, California (Interior and State of California, 2008).

The 1944 Orr Ditch Decree adjudicated water rights of the Truckee River in Nevada and established amounts, places and types of use, and relative priorities of the various rights, including the United States' right to store water in Lake Tahoe. The Orr Ditch Decree incorporated the 1935 Truckee River Agreement as binding among Sierra Pacific Power Company (Sierra Pacific – now referred to as NV Energy), Truckee-Carson Irrigation District, the Washoe County Water Conservation District (WCWCD), U.S. Department of the Interior (Interior), and certain other Truckee River water users. The Truckee River Agreement is an operating agreement that, among other things, provided for reduced Floriston Rates, and the construction of what is now Boca Reservoir. The Orr Ditch Decree, 1915 Truckee River General Electric Decree and the Tahoe-Prosser Exchange Agreement, discussed in the following paragraph, provide the current operational framework and rules for Truckee River reservoirs. The provisions of the Orr Ditch Decree, as well as the recently adopted Truckee River Operating Agreement (TROA) are administered by the Federal Water Master appointed by the Orr Ditch court (Interior and State of California, 2008).

The Tahoe-Prosser Exchange Agreement supplements the Truckee River Agreement with additional criteria for operation of Lake Tahoe and Prosser Creek Reservoir. The Tahoe-Prosser Exchange Agreement allows specific streamflow releases to be made from Lake Tahoe when releases are not required to meet the Floriston Rates. Minimum releases of 70 cfs from April through September and 50 cfs the remainder of the year are made from Lake Tahoe when storage in Prosser Creek Reservoir is available for an exchange or when an equivalent amount of water in excess of Prosser Creek minimum releases of 5 cfs is available for storage. If inflow to Prosser Creek is less than these releases and no storage is available for exchange, releases from Lake Tahoe are reduced to the amount of inflow stored in Prosser Creek Reservoir (Interior and State of California, 2008).

The Newlands Project OCAP (referred to in the TROA as the Truckee Canal Diversion Criteria)

is a Federal regulation that establishes procedures to define the annual water demand of the Newlands Project and regulates the diversion of water from the Truckee River to meet that demand. The OCAP includes provisions for a maximum annual diversion, implementation of conservation measures to improve project efficiency, and criteria for diverting Truckee River water to the Newlands Project for agricultural use and storage in Lahontan Reservoir.

On September 6, 2008, the states of Nevada and California, the Federal Government, TMWA, and the PLPT signed the TROA to increase the operational flexibility and efficiency of reservoirs in the Lake Tahoe and Truckee River basins. The TROA will change the operation of Federal reservoirs and TMWA's exercise of its Truckee River water rights to (1) improve spawning conditions for the Pyramid Lake fishes; and (2) provide additional M&I water for Truckee Meadows during drought situations. The TROA is also expected to enhance recreational opportunities and improve streamflows and fish habitat throughout the Truckee River basin, and help improve water quality in the Truckee River downstream from Truckee Meadows.

The TROA EIS states that TROA "would have no significant cumulative effect on implementation of OCAP". Newlands Project water rights will retain their priority, water can still be diverted from the Truckee River to Lahontan Reservoir to meet OCAP monthly storage targets, and the method of calculating the maximum allowable diversions will not change. In the TROA EIS analysis it was determined that under baseline conditions and over the available 100 year hydrologic period of record, there would be approximately nine years in which the full Newlands Project irrigation supply would not have been provided. Under TROA, shortages would have occurred during the same nine years, but the amount of the deficit would have been slightly larger. This is due to anticipated increases in Truckee Meadows water right holders exercising their water rights, particularly during dry periods (Interior and State of California 2008).

Project Water Use

Construction activities would require water to be used for dust control in the project area. High quality reclaimed water suitable for landscape irrigation, including residential areas, would be purchased from a local water agency and could be used for dust management during construction. Water taken directly from the river would require the purchase of appropriate temporary water rights. Use of these temporary water rights would be considered a less than significant effect to existing water resources and supply.

Temporary irrigation would be provided for the revegetation efforts, including a subsequent three-year maintenance period. The goal of this temporary irrigation would be to increase plant survival rates, growth rates and encourage deep plant rooting. This would require frequent watering in the first season, followed by increasingly infrequent and deep watering in the second and third years. Drip irrigation would be used in most locations. It is estimated that approximately 125 acre-feet of water per year would be required to establish the riparian and associated vegetation. Appropriate water rights would be acquired, most likely by temporarily leasing or otherwise acquiring water rights. After the establishment period, the plantings would be self sufficient in regards to supplemental watering and would be sustained by raised ground water levels resulting from floodplain terrace excavation. Use of these temporary water rights would be considered a less than significant direct effect to existing water resources and supply.

The use of cofferdams would require the dewatering of small, isolated areas of the river for the construction of floodwalls and scour protection. The water removed from behind the cofferdams would be returned back into the river.

The relocation of North Truckee Drain would divert water under normal conditions as well as during flood events. The storage basins would only store water up to 48 hours during flood events to attenuate downstream flows and would not store water under normal conditions. None of these features are expected to have a direct or indirect effect on existing water resources and supply.

Effects to water resources and supply from construction-related activities such as dust control, dewatering behind cofferdams, and plant establishment would be short term and temporary only. Therefore, direct and indirect effects to water resources and supply would be considered less than significant. No mitigation would be required.

5.3 HYDROLOGY AND GEOMORPHOLOGY

5.3.1 Affected Environment

As indicated in Section 2.4.1 Flooding and Flood Damage, the Truckee River historically has been prone to flooding, which continues to pose a public health threat to Reno and the downstream communities of Sparks, Rainbow Bend, and Wadsworth. Development in the Truckee Meadows reach also incurs substantial damages due to flooding. The existing flood conditions in the project area are discussed further in the Hydrology section below.

The current geomorphology of the Truckee River is greatly influenced by human-induced alterations made to the river and its flows since the early 1900s. These activities have affected the channel stability and sediment transport dynamics, particularly within the Lower Truckee River reach. The existing geomorphologic condition of the river is discussed further in the Geomorphology section below.

Hydrology

Floods in the Truckee River Basin can be divided into three distinct types: general rain floods, cloudburst floods, and snowmelt floods. General rain floods, which occur during November through April, result from rainstorms covering a large portion of the basin and are characterized by high peak flows and durations of 3 to 6 days. Depending upon the temperature of the storm, general rain events can induce a partial melting of the snowpack in the mountains, increasing the peak and volume of the runoff. These are called “rain-on-snow events.” Rain floods have caused the major flood problems in the area. Cloudburst floods, which typically occur during summer months, are characterized by high peak flows on tributary streams with short duration and low volume. Snowmelt floods result from the melting of the snow pack during the late spring and early summer (April through July) and have relatively large volumes and long durations. The timing of peak flooding in the Truckee River varies from year to year. Timing of peak floods depends on two climactic scenarios: (1) mountain snowpack melt during the spring and (2) intense rain and/or rain-on-snow events.

Since about 1960, flood control works, consisting of reservoirs and channel modifications, have reduced the magnitude and frequency of flooding in the area. The 1950, 1955, 1986, 1997, and 2005 floods were similar in magnitude and were the most damaging because they occurred after residential and business areas of Reno began to spread to the south and southwest, areas that are more prone to flooding from the Truckee River and Steamboat Creek.

<u>Truckee Meadows Reach</u>

The Truckee River emerges from the more channelized downtown Reno area into the broader plains of the Truckee Meadows. It is this area that receives the greatest inundation of flood flows. The meadows area attenuates large flood volumes from the Truckee River. The flooding in this area is

characterized by ponding caused by hydraulic backwater effects from Steamboat Creek at its confluence with the Truckee River and from a natural bedrock outcrop in the Truckee River channel near Vista called the "Vista Narrows." The floodplain here is wide and expansive since the bedrock retards the flow of the river, creating a bottleneck.

Flooding around the Reno-Tahoe International Airport consists of sheet flow up to McCarran Boulevard. Flooding in the industrial area of this reach consists of both ponding and sheet flow. Flood-related problems in this area are aggravated by flood flows from Steamboat Creek, Boynton Slough, and Dry Creek. The estimated average non-damaging channel capacity through the Truckee Meadows is approximately 10,000 cfs. Minor flooding of parks and roadways adjacent to the river begins at between 6,000 to 9,000 cfs. Flooding that affects adjacent warehouse and other structures begins between 10,000 to 12,000 cfs, or about the 20- to 25-year event.

The current floodplains cover a large area and include the Reno-Tahoe International Airport, a significant portion of the Sparks commercial/industrial area, the UNR farm lands, the commercial/industrial area of Reno located around the airport, and residential areas along the Steamboat Creek floodplain.

The existing conditions flow frequency for the Truckee Meadows area is uncertain due to complex backwater interactions and significant overbank storage. For the reaches east of Highway 395, there is approximately a 1 in 15 (7 percent) chance of the river banks overtopping.

The tributaries flowing into the Truckee River between the Reno and Vista gages constitute about 364 miles of drainage area, only 280 square miles of which contributes flow to the Truckee River (Washoe Lake, located in the headwaters of Steamboat Creek, accumulates runoff from 84 square miles under all but the highest water year conditions). The tributaries receive smaller amounts of rainfall than the Sierras since general rainstorms crossing over the mountains tend to dry out as they move east and downward into the valley. The tributaries contribute approximately 20 percent of the maximum 7-day volume during the 1 percent chance event at the Vista gage. The bulk of the flooding in this area is driven by the runoff from the Sierra Nevada mountains (mainly the uncontrolled area between Lake Tahoe and the Reno gage) (USACE, 2007a).

The channel becomes narrow and flows become constricted at the Vista Narrows near the Vista gage. During historic floods, backwater from this constricted reach caused a lake to form upstream of the Vista gage.

The estimated average non-damaging channel capacity through the Truckee Meadows is approximately 10,000 cfs. Minor flooding of parks and roadways adjacent to the river begins at between 6,000 to 9,000 cfs (between a 1 in 22 and 1in 7 chance event, the average of which is 1 in 15). Flooding that affects adjacent warehouse and other structures begins between 10,000 cfs to 12,000 cfs, or about the 1in 20 to 1 in 35 chance event. The average annual runoff volumes in acre-feet (flow rates in cfs) for the Truckee River at East McCarran Boulevard Bridge below Reno are as follows (DWR, 1997):

- Average Water Year (1977-1995): 479,270 acre-feet (622 cfs)
- Low Water Year (1992): 64,220 acre-feet (88.7 cfs)
- High Water Year (1983): 1,717,980 acre-feet (2,373 cfs)

Most of the tributaries to the Truckee River in this reach (Steamboat Creek and North Truckee Drain) are ungaged. To quantify the amount of coincident runoff from the Truckee Meadows tributaries

during a specific frequency event on the Truckee River, the 7-day unregulated frequency curve at Reno was subtracted from the 7-day curve at Vista.

Lower Truckee River Reach

Within the Lower Truckee River reach, the current "100-year event" breaks out of the channel in Wadsworth and flows down an independent flow path parallel to the main channel. The breakout flows then recombine at a point about 6,000 feet downstream of the breakout. The results of the structural inventory indicate that few structures are located in the floodplains within this reach.

Table 5-1 provides historic peak flood flow information for the Lower Truckee River from Vista to Nixon. The largest floods of record for each gage come from the same storm events. Historic stream gage records indicate that the biggest factor driving peak flow on the Truckee River below Vista is the hydrograph that originates upstream of Vista. The effect of local runoff (due to its timing and relatively

Table 5-1. Historic Peak Flood Flows on the Lower Truckee River.

Date of Flood	Peak Flood Flows on the Truckee River (in cfs)				
	Truckee River at Vista	Truckee River near Tracy	Truckee River Below Derby Dam	Truckee River Near Wadsworth	Truckee River Near Nixon
2-3 January 1997	~21,000*	Gage broke	19,700	19,100	21,200
15 November 1963	18,900	No record	18,400	No record	14,400
18-19 February 1986	16,100	17,500	16,900	16,800	16,300
23-24 December 1964	11,700	No record	11,400	No record	9,950
14 January 1980	9,970	10,200	8,700	8,820	8,600
20 December 1981	8,550	8,780	8,270	8,210	7,420
13-14 March 1983	8,040	8,150	8,310	8,000	7,410

* Estimated value adopted by USACE. Value derived during calibration of hydraulic model to 1997 flood and by using older rating curve for highwater mark at old Vista gage site. USGS official value is 18,400 cfs.

smaller volume) is less significant. Moreover, the effect of local runoff also seems random from storm to storm. There are instances when peak flows at a downstream gage are higher than that recorded at Vista, and other times when the peak flows are lower. The timing of the local runoff is apparently not coincident with the peak of the mainstem hydrograph as the historical record rarely shows a significant increase in peak from upstream to downstream.

Long Valley Creek is the main tributary that contributes flow to the Truckee River between Vista and Wadsworth. Rainfall tends to decrease as large, general rainstorms move east into the desert valley. Analysis based on historical data indicates that the peak runoff from Long Valley Creek tends to occur at a different time than the peak flow on the Truckee River. Due to the results of the analysis, a flow contribution from Long Valley was not included in the design hydrology (USACE, 2007a).

Based on these historic flows, USACE hydrologic analysis indicates that there is approximately a 1 in 15 (7 percent) chance of flooding in the Lower Truckee River. The current flood capacity of the lower Truckee River from Vista to Wadsworth is approximately 6,000 cfs.

Table 5-2 provides average annual runoff volumes in acre-feet as well as flow rates in cubic feet, as provided by the California Department of Water Resources (DWR) in 1997.

The USACE estimated channel loss rates for the Lower Truckee River. Only flows exceeding 5,000 cfs were analyzed since values below this threshold were found to be equally divided between losses and gains (zero average loss). The sand and gravel alluvium layers found in the channel bed are

likely to be highly permeable and easily transmit flow. As the water level rises above normal baseflow, loss rates are high; however, as water leaves the channel into the overbank, a much less permeable layer of soil on the land surface will not support high infiltration.

Table 5-2. Average Annual Runoff Volumes in Acre-Feet (flow in cfs) for the Lower Truckee River.

Gaging Station Location	Average Water Year	Low Water Year	High Water Year
Truckee River at Vista (below Steamboat Creek – Station 10350000)	579,180 (800 cfs)	114,390 (158 cfs)	2,016,980 (2,786 cfs)
Truckee River below Tracy (Station 10350400)	565,420 (781 cfs)	111,490 (154 cfs)	1,977,180 (2,31 cfs)
Truckee River below Derby Dam (1,500 feet – Station 10351600)	269,320 (372 cfs)	4,460 (6.16 cfs)	1,759,270 (2,430 cfs)
Truckee River above Pyramid Lake (Nixon – Station 10351700)	362,710 (501 cfs)	17,450 (24.1 cfs)	1,888,860 (2,609 cfs)

Source: DWR, 1997

Geomorphology

Geomorphology is the study of landform evolution. Any project that potentially affects natural river processes requires an understanding of the current and historical fluvial geomorphology of the system. This includes human-induced alterations and resulting effects.

The current geomorphology of the Truckee River is greatly influenced by human-induced alterations made to the river and its flow since the early 1900s. These alterations to the river included straightening and widening for flood control and construction of I-80, the Southern Pacific Railroad, and the Truckee Canal. Straightening the channel had the effect of increasing the sediment transport rate because all of the streamflow was held within the banks. This caused the channel slope and flow depth to increase, and result in higher stress on the channel bank and bed material. The result was a deeper channel cut and more bank erosion.

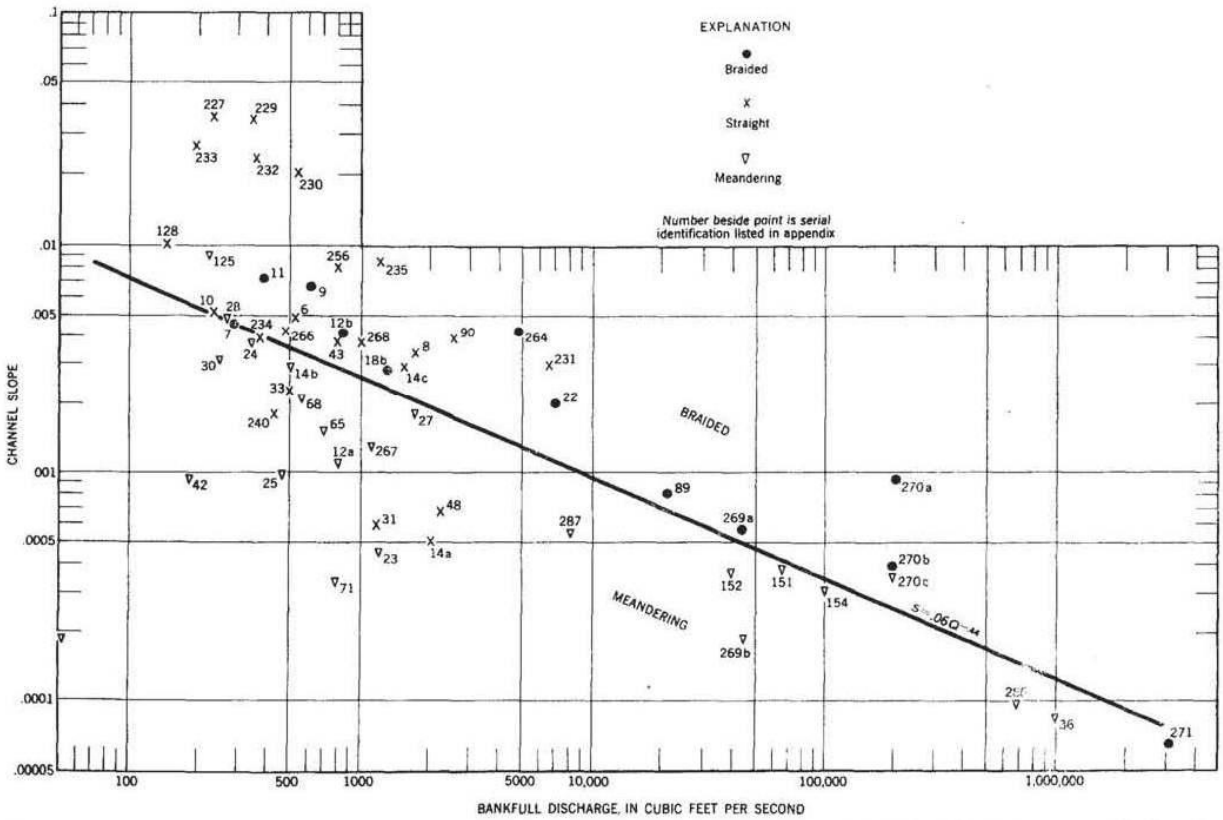
When I-80, the Southern Pacific Railroad (now Union Pacific Railroad), and the Truckee Canal were constructed in the canyon between Vista and Wadsworth, the Truckee River was constricted and realigned. Large meanders were cut off at river mile (RM) 30 and RM 35, requiring bank protection measures in these areas to compensate for the increased hydraulic energy through the cutoffs. Additional bank protection, including rock revetment, rock groins, and gabion groins, have been placed by local interests and commercial facilities (WET, 1991).

The management and distribution of water within the Truckee River Basin have also contributed to the alteration of the Truckee River geomorphology. Water storage and distribution structures influence erosion and deposition rates, river discharge, and subsequently, channel morphology. Major Truckee River Basin water-storage projects include the outlet works at Lake Tahoe; Donner Lake; Independence Lake; and Boca, Prosser Creek, Stampede, and Martis Creek reservoirs.

Finally, diversion of water from the river for irrigation and municipal and industrial (M&I) uses also have had a dramatic effect on the geomorphology of the river. In particular, the diversion of water down the Truckee Canal at the Derby Dam to the Newlands Project caused the lowering of Pyramid Lake by elevations of up to 80 feet between 1905 and 1963. This base level lowering generated channel incision from Pyramid Lake upstream to Numana Dam.

Although it is widely agreed that detrimental effects to the river channel have occurred, studies have suggested that the majority of the Truckee River between Verdi and Pyramid Lake has been stable for the past several decades (Miller et al., 1994). It has been proposed that the Truckee River is morphologically close to a threshold between a braided and meandering channel (Harvey et al., 1981).

Several researchers have published relationships that can be used to illustrate the position of the Truckee River in the continuum of channel form, from meandering to braided. Leopold and Wolman (1957) developed a relationship between bankfull discharge and channel slope, which illustrated the phenomenon that large rivers with steep slopes never have channel forms that are composed of a single, threaded meandering channel, but rather, have a braided form. As can be seen on Figure 5-2 below, the Truckee River plots almost directly on the transition line they developed, suggesting that the channel form for the river, in its existing physical setting, may tend to shift between meandering and braiding, during dryer or wetter periods.



Source: Leopold, Luna B., and Wolman, M.G.. 1957. *River Channel Patterns: Braided, Meandering and Straight.* U.S. Geological Survey Professional Paper 282-B, 51p.

Figure 5-2. River Channel Patterns: Braided, Meandering, and Straight.

Other researchers have further explored this phenomenon and many other relationships have been developed. Henderson (1963) published a relation that expanded on Leopold and Wolman's 1957 study. Henderson's study shows the effect of particle size on channel form, and also shows that the Truckee River is in the transitional region of the plot, based on its bankfull discharge, slope, and particle size characteristics. Alabyan and Chalov (1998) published yet another relationship that used stream power to predict channel form. The Truckee River plots near their meander-branching threshold, which also indicates that its channel form would be likely to shift somewhat during dryer and wetter periods.

The Truckee River, however, when expressing a multiple channel form, is not a typical braided river where flows are separated by bars within the river. Rather, the river's multiple channels are separated by large islands that were cut from the floodplain. For the Truckee River, the expression of multiple channel characteristics varies both in space and time, and not all channel segments have historically expressed multiple channel characteristics (Otis Bay, 2004).

Channel Stability

Catastrophic flood deposits of Donner Lake and Tahoe glacial stages have occurred in the Truckee River valley from the Lake Tahoe outlet through Reno and to the northern margin of the Truckee Meadows. These flood events caused the upper portion of the Truckee River drainage basin from Lake Tahoe to Reno to be over-steepened. Throughout glacial periods, immense quantities of sediment were transported through the Truckee River canyon to the Truckee Meadows during large, often catastrophic floods, forming the large outwash deposits underlying much of Reno and Sparks (Cities of Reno and Sparks, 2007). Because the valley widened abruptly at the west end of the Truckee Meadows, the deposits took the form of an extensive alluvial fan. During this period, the basement rock forming the Truckee Meadows was downwarping and tilting to the east, and therefore, the alluvial sediments are thicker on the east (Cities of Reno and Sparks, 2007).

Active riffles composed of gravel- and cobble-sized sediments are interspersed with inactive boulder riffles that are derived from underlying glacial outwash deposits. West of U.S. Highway 395, the more modern floodplain deposits are narrow and well-entrenched within outwash. The channel in this area has eroded and sorted the older deposits, which were often composed of larger sediment particles than the current channel is capable of moving. Relatively immobile riffles common in parts of western and central Reno represent sorted outwash deposits (WET, 1990; Miller et al,, 1994).

East of Highway 395, much of the valley is mapped as Holocene floodplain deposits, and the floodplain has therefore been extensively reworked by the river in the last 10,000 years. However, floodplain sediments in the upstream half of this reach (McCarran Boulevard upstream to Highway 395) are far different than floodplain sediments in the downstream half (McCarran downstream to Vista), suggesting a different set of Holocene geomorphic processes in these two areas (Cities of Reno and Sparks, 2007). In the upstream half, gravel and larger sediments are common in the upper five feet of geotechnical borings. These sediments are typical channel materials, indicative of floodplains created by meander translation across the floodplain and some overbank deposition. The Holocene river probably constructed floodplain from reworked in-situ outwash deposits and sediment supplied from upstream (Cities of Reno and Sparks, 2007).

About one-half mile downstream of McCarran Boulevard, the nature of the floodplain sediment changes dramatically. At a five-foot depth, geotechnical borings retrieved very little material larger than sand in size. Instead, streambanks and the floodplain are entirely composed of very fine-grained, cohesive lacustrine deposits (WET, 1990). These sediments are termed lacustrine or lake deposits because they were deposited in ponded water during large floods. The lake in which they were deposited was temporary, occurring for only a few hours or days during flooding. The characteristics of the deposits are similar to deposits in permanent lakes (Cities of Reno and Sparks, 2007).

Bank erosion and lateral instability of the Truckee River appear to be limited in places by narrow valley floor widths and coarse-grained colluvial, alluvial fan, and glacial outwash deposits along the river system. Based on the tractive force necessary to transport Truckee River bed material, Miller et al. (1994) suggested that the vertical stability of the river is partially enhanced by the development of streambed armor composed of particles that cannot be transported under the current hydrologic regime. They

observed riffles with spacing typical of equilibrium channels (five to seven times the channel width), particularly along reaches upstream of Reno. However, collections of larger homogeneous stream channel material (greater than three feet in diameter) with little evidence of overlapping are locally present at spaces greater than five to seven times the channel width, suggesting that these larger materials were not transported, but instead were left behind as surrounding smaller materials were eroded.

Due to the presence of this larger homogeneous material, Miller et al. (1994) concluded that much of the sediment load along the Truckee River cannot be transported under the current hydrologic regime and that streambed armoring may be an important factor limiting the potential for future incision along some portions of the Truckee River. They also speculated that the headward movement of knickpoints would have the ability to destroy streambed armor, allowing incision to occur, but at a potentially slower pace.

Sedimentation

The downtown Reno reach of the Truckee River from Booth Street to Wells Avenue contains repeated sequences of inactive boulder riffles with very little sediment storage. Previous channel improvements consisted of boulder removal in this part of the reach. Sediment storage in this reach is located primarily in mid-channel bars located on the downstream side of the bridges. Between Booth Street and Ambrose Park, the Truckee River has a steep gradient with coarse bed material characterized by a stepped bed profile (WET, 1990).

The watersheds upstream of Vista contribute sediment into the Truckee River. In addition to the sediment contribution from surrounding watersheds, the Truckee River currently, and in the past, has acquired sediment from surrounding glacial outwash terraces. Lateral input of coarse material (especially large boulders) from these outwash deposits has had a significant effect on the morphology of the river. Although the channel is relatively fixed between the Greg Street Bridge and McCarran Boulevard Bridge, there is considerable sediment storage in bars (WET, 1991).

The portion of the lower Truckee River between the Vista stream gage and Derby Dam is a significant sediment source for the lower Truckee River. In this subreach, the Truckee River floodplain is also narrowly confined within the Truckee Canyon. The floodplain is narrow and is commonly locally displaced by advancing alluvial fans depositing sediment into the channel. Local sediment deposition occurs upstream of locations where the valley is narrowed by alluvial fans. Gravel mining of fluvial and glacial outwash deposits from the floodplain was common historically. Between 1994 and 1997 the river captured a gravel mining pit just downstream of the Tracy power plant.

The confined nature of the canyon that is bedrock-controlled between Derby Dam and Wadsworth results in sediment storage within this reach that is minor. Alluvial fans that have formed within small tributary drainages in the canyon historically have contributed the most sediment to this subreach. Due to the construction of the Truckee Canal and I-80 through the canyon, sediment delivery to this reach of the river has been substantially reduced (WET, 1991). Most sediment storage occurs on small, vegetated, bank-attached bars. Lateral migration associated with bendway development is minimal. Coarse lag deposits are present in the river, where coarse alluvial fans intersected the river prior to the construction of the Truckee Canal. These deposits were likely delivered to the channel via debris flows on the alluvial fans and were frequently mobilized under current hydrologic conditions (WET, 1991).

The majority of channel material is within the size range of gravels. As would be expected, the data indicate an overall decrease in particle size in the downstream direction. However, an increase in particle size downstream of Derby Dam is likely attributable to one or more of the following factors: (1)

the presence of numerous alluvial fans contributing coarse material to the channel between Derby Dam and the I-80 bridge, (2) the presence of Derby Dam functioning as a sediment trap, and (3) the presence of coarse-grained glacial outwash deposits within these segments.

Truckee River Delta

A delta is a deposit, partly on the land surface, built by a river flowing into an estuary, lake, or reservoir. The TROA EIS/EIR includes information regarding the current condition of the Truckee River delta at Pyramid Lake, which is summarized below (Interior and State of California 2008).

At the point of inflow, the Truckee River is building a delta northward into Pyramid Lake. The delta is currently about 4,000 feet wide at the mouth, 2,500 feet wide at the head, and about 13,000 feet long. At times, the river channel through the delta is shallow, braided, and poorly defined; and upriver passage of the endangered cui-ui and threatened LCT during the spawning season is impeded or precluded during low flow years. See Section 5.8 Special-status Species.

Decreased inflow caused the elevation of Pyramid Lake to recede from 3,870 feet in 1910 to 3,796 feet in 1994 (observed data). The decline has led to erosion and headcutting upstream of Pyramid Lake. Headcutting is the sudden change in elevation or knickpoint at the leading edge of a gully. Headcuts can range from less than an inch to several feet high, depending on several factors. This headcutting has resulted in channel degradation and incision of a pre-existing delta complex between Pyramid Lake and Nixon. Consequently, substantial amounts of locally eroded sediment are added to the normal sediment load of the Truckee River. Deposition of this combined sediment load has formed the delta at the mouth of the Truckee River. This locally eroded sediment was greatly reduced after construction of Marble Bluff Dam in 1975, which controlled upstream headcutting and sediment trapping behind the dam structure.

Change in aerial extent of the delta depends on the interaction of several factors including (1) fluctuation pattern of lake elevation and (2) erosion and sediment inflow. As water elevation decreases, more of the existing delta becomes exposed. However, a decrease in water elevation changes the hydraulic conditions at the river/lake confluence. More specifically, a decrease causes a drawdown effect, resulting in higher water velocities, increased erosion, and thus movement of the delta farther downstream into the lake. An increase in average lake elevation has the opposite effect. Initially, the aerial extent of exposed delta decreases as it is submerged. However, the increased water elevation causes a backwater effect, resulting in lower water velocities, increased deposition farther upstream, and movement of the delta farther upstream into the river channel.

In general, increased erosion and thus sediment inflow to the lake increases the area extent of the delta. Decreased erosion and sediment inflow have the opposite effect. Flows entering Pyramid Lake carry sediment of varying concentrations. Because the lake has no outlet, all sediments entering Pyramid Lake are deposited there. The coarsest sediment particles (sand and gravels) entering the lake deposit first and form the Truckee River delta. Finer sediment particles (silt and clay) are transported farther into the lake and deposit in deeper water.

5.3.2 Environmental Consequences

The following discussion of effects the proposed flood risk management features would have on hydrology and fluvial geomorphology takes into consideration the importance of critical infrastructure in the project area's built environment.

Since authorization of the 1988 project, several studies and analyses have been conducted on the current and potential future conditions of the Truckee River's fluvial geomorphology. Water Engineering

& Technology, Inc. (WET) (1990) performed a detailed geomorphic analysis of the Truckee River from Booth Street in Reno downstream to Vista, including Steamboat Creek and Boynton Slough, to determine potential effects of sedimentation from the 1988 authorized flood control project. Additionally, WET (1991) performed a reconnaissance-level geomorphic field investigation of the Truckee River from Vista to Pyramid Lake to address the potential for restoration of fish and wildlife habitat; stream bank stabilization and erosion control; flood risk management; and modification of existing projects within the study reach. Otis Bay (2004) prepared for USACE an updated geomorphic assessment for restoration in the lower Truckee River from Vista to Pyramid Lake. In 2008, HDR conducted a conservative study to evaluate bank, bed, and pier protection needs on the Truckee River as a result of the proposed project (HDR, 2008). Findings from these studies were used to help establish the existing and potential future with- and without-project geomorphic condition to form the basis for analysis of effects.

Significance Criteria

Effects on hydrology ((i.e., changes in inflow, changes in water surface profiles and flow distribution, assessment of local and systemwide resultant impacts, upstream and downstream impacts, etc.) and geomorphic conditions may be considered significant if implementation of an alternative would:

- substantially alter the existing drainage pattern of the site or area, including the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site;
- significantly raise flood stage elevations;
- substantially increase the frequency and duration of inundation of lands;
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on or off site;
- increase channel and/or bank erosion;
- substantially alter in existing migration processes;
- change local hydraulics; or
- result in a loss of sediment supply.

While this section addresses the significance of project-induced changes in flood risks, the significance of other types of surface water hydrology-related effects, both direct and indirect, is assessed in the sections of related resource areas (e.g., water quality, fisheries, recreation, etc.).

No Action Alternative

Under the No Action Alternative, no Federally funded flood risk management improvements would take place in the project area. Without Federal funding, local government agencies in the Truckee Meadows (via the TRFMA) would likely implement some flood control improvement projects on their own, albeit considerably fewer than they would be able to complete if Federal funding was available. The local projects that would be implemented without Federal funding have not been entirely defined but would likely reduce flood risks to some extent and would affect surface water hydrology and local geomorphic controls to some extent in the project area. It is anticipated that the downtown bridges that contribute to downtown Reno flooding (the Virginia, Sierra and Lake Street bridges) would likely be replaced by the TRFMA and other, as of yet undefined, flood control improvements would take place in the Truckee Meadows. If the TRFMA pursues other local flood control improvements without Federal funding, these projects may have some effect on surface water hydrology and geomorphology.

The local projects that would be implemented without Federal funding have not been entirely defined. It is anticipated that the downtown bridges that contribute to downtown Reno flooding (the Virginia, Sierra and Lake Street bridges) would likely be replaced by the TRFMA and other flood control improvements would take place in the Truckee Meadows. The replacement of the existing bridges would lower water surface elevations in the downtown area during flood events as the new bridges would likely reduce flooding in downtown Reno by allowing more water to pass underneath, unlike the existing bridges which backup water during floods. Replacement of these bridges would also increase flow rates immediately downstream of the bridges during flood events.

Any discussion of project effects on fluvial geomorphology of the Truckee River must take into consideration the highly altered state of the river's current geomorpholigical condition, particularly in the Truckee Meadows reach. Due in large part to actions taken to accommodate development and construction of critical infrastructure, the river's natural tendency to migrate throughout its floodplain is constrained by existing features constructed to protect the built environment, which includes roadways, buildings, water diversions, railroads, and utilities. The development of recreational facilities, such as parks and whitewater parks, along and within the river, further reflect a desire to maintain the current alignment of the river through the Truckee Meadows reach. The anthropogenic constraints to geomorphological processes are less prevalent in the Lower Truckee River reach; however, certain critical infrastructure such as I-80, the UPRR, and the Truckee Canal, still present limitations on natural geomorpholigical processes.

In the Truckee Meadows and Lower Truckee River reaches, natural geomorphic processes typical of sediment-limited systems would continue under this alternative, as the river seeks an equilibrium condition. These processes include but are not limited to lateral migration, localized scour and incision, and continued erosion of active bank cuts. These processes may be occurring at a slower pace (relative to long term historical trends) due to the existing streambed armoring and grade control structures (dams, bridges, weirs, rock formations). Reestablishment of floodplains and associated riparian habitat would, therefore, progress at a slower pace in the future and would only be within the degraded or enlarged channel (smaller than historic floodplains). Restoration efforts from The Nature Conservancy and others would accelerate the channel evolution, dependent upon funding and land availability.

Alternative 3-Floodplain Terrace Plan

Construction-related soil and channel disturbances would temporarily increase erosion potential along channel banks and upland areas, temporarily affecting sediment load within the river. This is considered a significant temporary effect but would be minimized with implementation of Best Management Practices presented in Section 5.4 Water Quality to minimize soil disturbance and erosion. This alternative is not expected to have a significant direct or indirect effect on reducing natural meander processes because of the channel's current constraints to migration by existing features constructed to protect the built environment, which includes roadways, buildings, water diversions, railroads, and utilities.

<u>Truckee Meadows Reach</u>

Hydrology

This alternative would reduce the risk of flooding in the east Sparks industrial area up to the 2% ACE event by increasing flow rates and water surface elevations within the project's floodway (the flowage easement area between the proposed levees and floodwalls); lowering water surface elevations in the Sparks industrial area south of the I-80 freeway and the commercial/industrial area around the airport; and increasing water surface elevations within the County's existing floodway area (primarily within the

UNR Farms fields east of McCarran Boulevard). This increase in water surface elevations within the UNR Farms fields would also affect 22 parcels south of UNR Farms with an increase of up to 0.6-foot when compared to the without-project 2% ACE floodplain, as shown in Figure 5-3.

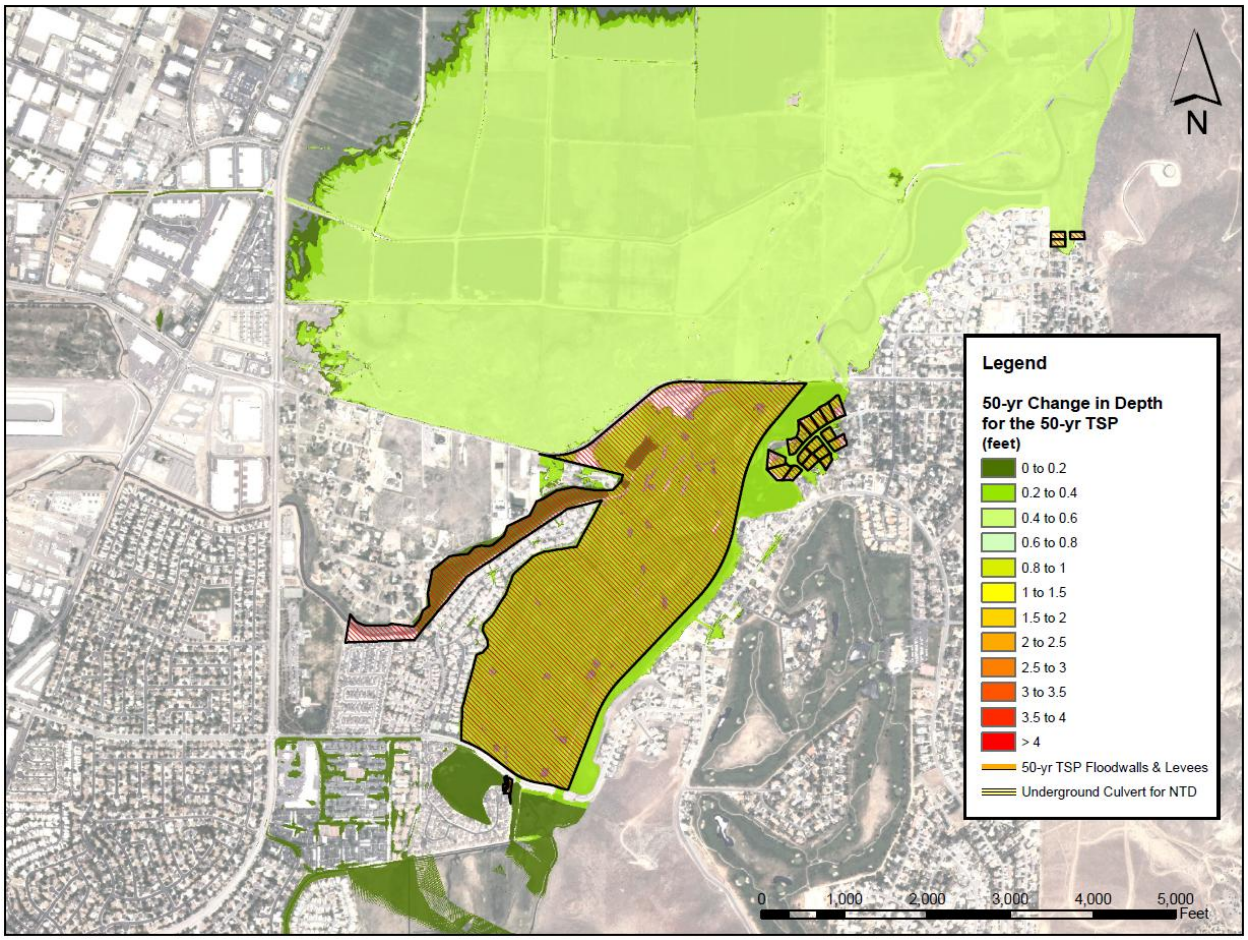


Figure 5-3. Change in the 2% ACE Floodplain Depth South of UNR Farms under Alternative 3-Floodplain Terrace Plan Conditions

Further, as discussed in Section 3.4.1, an indirect effect of this alternative would be the increase of water surface elevations by about 7 inches south of the UNR Farms area and by about 6 inches around the North Truckee Drain north of I-80 in the 1% ACE event, as a result of "stacking" water in the project floodway, backwater effects generated by the Vista Narrows, and reducing drainage efficiency on the North Truckee Drain between floodplains north of I-80 and south of I-80 (from capping Peoples Drain junction boxes and placement of the North Truckee Drain into culverts).

During the 1% ACE event, the with-project flood elevations would exceed the first floor elevations of an estimated 900 existing residences on the southern periphery of the UNR Farms area that are also within the without-project 1% ACE floodplain. An estimated additional 175 residences that are outside of the without-project 1% ACE floodplain would be within the limits of the with-project floodplain, but it is estimated that their first floors would still be above the with-project flood elevation. Hydraulic modeling also found that the 1% ACE flood elevation on both sides of the North Truckee Drain immediately north of I-80 would be increased by approximately 0.5 to 1 foot due to backwater effects in the drain.

The increased 1% ACE flood elevations caused by the NED Plan would trigger an NFIP

regulatory requirement (44 C.F.R. § 60.3(d)) that communities must seek conditional approval from FEMA before allowing certain encroachments upon a floodplain. Applications for such conditional approvals must certify, among other things, that no structures are located in areas that would be impacted by increased base flood elevations (44 C.F.R. § 65.12(a)(5)). Under USACE policy, compliance with the NFIP is a non-Federal responsibility and compliance costs would be borne by non-Federal interests. Participation in and compliance with applicable Federal floodplain management and flood insurance programs is a condition of non-Federal sponsor (in this case TRFMA) participation in Federal flood control projects. Additional costs of NFIP compliance that would result from the USACE project are identified as associated costs of the project and are included in the economic costs of the project. Incidental flood damage reduction benefits resulting from NFIP compliance have been subtracted from the estimated NFIP compliance costs. (FEMA/USACE joint memo dated June 29, 2012).

Several options for NFIP compliance were identified and it was determined that non-structural methods including house raising would likely be the lowest cost option on the south side of the Truckee River. Through coordination with regional Federal Emergency Management Agency (FEMA) staff, it was verified that raising the first floors of affected residences above the new base flood elevation would comply with the NFIP regulation. Approximately 764 homes would need to be raised in the area south of the river. Estimated costs include temporary relocation of residents, construction of foundations and supports, reconnection of all utilities, construction of new steps, porches or decks, repair concrete and restoring landscaping. Approximately 128 apartment units, 4 commercial structures and 3 public buildings would also need to be raised or “wet flood-proofed” with closures and sealing.

For the north side of the Truckee River, a 400 cfs capacity pump station on the North Truckee Drain with an outfall to the Truckee River would be the lowest cost option. Because compliance with the NFIP is a non-Federal responsibility, the affected NFIP communities could develop their own plan for compliance with the NFIP and are not required to implement the least-cost options identified by USACE.

USACE policy allows mitigation for induced flooding to be recommended as a project feature when it is economically justified or there are overriding reasons of safety, economic or social concerns, or a determination of a real estate taking has been made (ER 1105-2-100, para.3-3.b.(5)). Potential mitigation measures for induced flooding were considered by USACE but none were found to be economically justified. The other structural and non-structural measures considered for the south side of the Truckee River were: levees and floodwalls to protect existing structures; a large detention basin with perimeter levees in the UNR Farms area; excavation of the Vista reefs including additional downstream hydraulic and environmental mitigation; and purchase/removal of the affected structures. The other structural and non-structural measures considered for the north side of the Truckee River were ring levees and raising/wet flood-proofing existing residential and commercial structures. Raising/flood-proofing structures on the south side and a pump station on the north side were found to be the least costly options based on rough cost estimates for each measure by District civil and cost engineering staff using their professional experience. Because of the small increase in flood elevations and the low recurrence frequency of induced flooding, there are no overriding safety, economic or social concerns, and no real estate taking would occur within the areas of induced flooding in the Truckee Meadows reach. Therefore, mitigation for induced flooding in the Truckee Meadows reach is not proposed as a project feature of the Floodplain Terrace Plan. The project would not implement mitigation to avoid or compensate for these effects.

The proposed flood risk management features in this reach would alter the existing drainage pattern of the site or area and increase the rate or amount of surface runoff in a manner that would result in induced flooding off site. This induced flooding would raise flood stage elevations in the area south of UNR Farms and north of I-80 in East Sparks. However, with the infrequency of the induced flooding and with TRFMA’s NFIP compliance measures in place, these changes in drainage patterns and flooding off

site would not be considered substantial and would, therefore, be a less than significant effect.

The conveyance of water during flood events would be increased along the North Truckee Drain with this alternative and the interior drainage improvements would direct flood-induced water back into the river.

The new recreation trails and other facilities would either be above areas that flood after construction of new setback levees and terraces, or would be designed to not interfere with, or back up, flood waters if they do flood occasionally. Therefore, the new recreation facilities would have a less than significant direct and indirect effect on drainage patterns within the project area.

Geomorphology

The proposed flood risk management features could have direct and indirect effects on channel stability and sedimentation in this reach. Currently, the existing Truckee River, Steamboat Creek, Boynton Slough, and North Truckee Drain channels are relatively stable with respect to plan form and vertical profile. However, localized bank erosion along the outside of some of the bends is ongoing on the Truckee River (between McCarran Boulevard and Vista) and on Steamboat Creek (between Pembroke Drive and the Truckee River). With the project in place, localized bank erosion of unprotected banks is expected to continue. Results of the USACE sediment budget analysis of Alternative 3(d) and the Locally Developed Plan indicated a minor potential for increased deposition between Greg Street and McCarran Boulevard on the Truckee River(USACE, 2008b). Therefore, the sediment deposition increase is expected to be of less magnitude as a result of the Floodplain Terrace Plan and the depositional trends on the Truckee River and Steamboat Creek, downstream of McCarran Boulevard, would remain about the same as current conditions. Overall, with the natural bed armoring, and the existing constructed armoring, currently in place, as well as the proposed scour protection features of this alternative, direct and indirect effects to the river's existing geomorphologic condition would be considered less than significant.

Levee and On-bank Floodwall Construction. Levee and on-bank floodwall construction, including setback levee construction, would directly affect channel stability and sedimentation by direct alteration of the riverbank and/or upland areas receiving fill. These effects are considered to be of long term duration, of probable potential to occur, and of limited geographic extent. In addition, increased containment of flows during flood events caused by levee and on-bank floodwall construction would result in incrementally higher peak flows and velocities in areas adjacent to and downstream of the levees. The increased tractive force of higher peak flows can cause channel bed incision, but the natural channel bed armoring currently in place in this reach makes the potential for resulting future channel incision unlikely.

While the likelihood for future channel incision is low, the potential increase in scour when compared to existing conditions is sufficiently high enough at critical infrastructure locations that USACE conservatively has proposed scour protection measures at these locations, pending more detailed geotechnical analyses during the design phase of the project. Thus, the effects on channel stability and sedimentation from increased peak flows downstream of levee features are reduced both by existing natural and constructed channel bed armoring and by implementation of planned scour protection measures to protect critical infrastructure. Proposed scour protection features are discussed further below. The direct and indirect effects of levee and on-bank floodwall construction on fluvial geomorphology in the Truckee Meadows reach are considered to be less than significant.

In-channel Floodwall Construction. Approximately 3,150 lineal feet of in-channel floodwalls would be constructed on the north bank of the Truckee River. To prevent scour along the base of the

floodwall, designs include placement of riprap armoring both above and below the streambed. Local modification of fluvial geomorphology would occur where floodwalls are constructed, both directly in the footprint of the floodwall and where excavation for construction access and wall toe armoring (riprap) is required. Restoration of the stream bed would be implemented after wall and riprap placement.

As with on-bank levees and floodwalls, in-channel floodwall construction would result in higher peak flows and velocities in areas downstream. This increase in peak flows and velocities would increase potential for channel scour to occur, in turn affecting channel stability and sedimentation. In order to reduce this change in channel scour potential within the Truckee Meadows reach, bed, bank, and bridge pier scour protection has been included as a project feature at critical locations within this reach. See the discussion on scour protection features, below.

Although the effects of floodwall construction on fluvial geomorphology are considered to be of probable potential to occur, of long term duration, and of extensive geographic extent, the implementation of scour protection features and restoration of the channel bed following floodwall installation would reduce these direct and indirect effects to less than significant in the Truckee Meadows reach.

Scour Protection Features. The construction of levees and floodwalls in the Truckee Meadows reach have the potential to increase peak discharge, channel velocity, and channel shear stress in the project area and downstream. This could result in an increase in scour potential at certain critical locations along the river. Existing facilities that could be affected include the river bed and banks, bridges, diversions, and grade control structures.

In order to avoid or minimize these increases in scour potential in this reach, the Floodplain Terrace Plan proposes approximately 11,100 linear feet of riprap scour protection, along with 1,700 linear feet of bioengineered bank scour protection where modeled flow velocities are lower, at critical locations along the Truckee Meadows reach of the river. In addition, bridge pier scour protection is proposed at Glendale Boulevard, Greg Street, Rock Street, and E. McCarran Boulevard bridges.

All stabilization measures are intended to prevent or reduce lateral stream migration. All bank stabilization measures at least temporarily change sediment yield characteristics of a channel. Most cause local scour and many induce sediment deposition. These effects tend to be temporary, though their results may persist for long periods of time, particularly in streams with armored beds and few tributaries.

Riprap seldom has a significant effect upon energy processes. Riprap armor, in general, has little local or cumulative effect on water storage or exchange processes, and its impact upon hydrodynamics is generally associated with change in resistance. Riprap techniques generally reduce local bank erosion but induce local scour. Scour usually occurs at the toe of the armor structure and extends into the stream about two to three times the scour depth. However, the natural channel bed armoring currently in place in this reach makes the potential for resulting future channel incision unlikely. Riprap techniques that use materials with high resistance values can also induce local sediment deposition, usually on and within the armor material.

Careful planning can minimize effects due to construction, and design features can often be incorporated into riprap structures that will improve their habitat value.

Although considerable ecological direct and indirect effects are often associated with riprap, as discussed in Section 5.4 Water Quality, Section 5.5 Vegetation and Wildlife, Section 5.6 Fisheries, and Section 5.7 Special-status Species, it is still one of the most ecologically and aesthetically desirable techniques for erosion control and under certain conditions can be ecologically desirable. Stabilizing stream channels with riprap can reduce sediment loads, improve water quality, and allow reestablishment

of riparian vegetation. Stone used in riprap structures provides hard substrate habitat that can be important in some sand bed streams where it might be limited, and spaces between riprap stones provide velocity refuge and cover for aquatic invertebrates and small fishes.

Bioengineered slope stabilization techniques, in general, have direct and indirect effects similar to those for riprap techniques. They reduce channel evolution through migration. Energy effects are typically minor. The effects from slope stabilization techniques upon storage, water exchange, and hydrodynamics are similar to those for armoring techniques. Bioengineered slope stabilization often employs vegetation, which can increase resistance relative to riprap.

The direct effect of reducing channel migration and indirect effect of changing sediment yield characteristics from installation of scour protection measures are considered to be of long term duration, of probable potential to occur, and of extensive geographical extent. However, given the river's current geomorphologic condition in the Truckee Meadows reach, and implementation of design features that would minimize changes to channel grade, contours, and capacity, as well as restoration of the channel to pre-project conditions to the extent practicable following construction, scour protection features would have less than significant effects on existing channel stability and sediment load in this reach.

Floodplain Terracing. The terracing is intended to provide increased containment for non-critical flood stage flows. These measures would directly effect geomorphologic processes by reconnecting the river to portions of its historic floodplain. Active excavation of floodplain terraces in locations of the reach that do not require protection of the built environment would indirectly allow, to a limited degree, the river to pursue more natural channel evolution processes in this area.

Increased sedimentation may occur when flows reach freshly graded terrace surfaces, prior to the establishment of a plant community. To that extent, active revegetation of the terraced area is included as a project feature to reduce the potential for increased sedimentation. The direct effect of reconnecting the river to portions of its historic floodplain and the indirect effect more natural channel evolution processes on the floodplain terraces are considered to be of long term duration, of probable potential to occur, and of extensive geographical extent. Indirectly, floodplain terrace features are considered to provide a limited beneficial effect to the Truckee Meadows reaches fluvial geomorphologic condition by allowing limited channel migration as well as a limited sediment source and deposition location.

Enclosure of North Truckee Drain. Under this alternative the North Truckee Drain south of I-80 would be placed into two culverts thereby replacing the open channel. This construction would occur outside of the Truckee River channel and floodplain, except where the North Truckee Drain connects to the river channel. At the new outfall location into the Truckee River, indirect effects of locally increased peak flows on the river's geomorphic form and function would be minimized by implementation of scour protection measures within the river channel at the drain's confluence. Direct and indirect effects to the geomorphologic condition from this feature would be less than significant.

Recreation Features. Local effects to fluvial geomorphology would include excavation and grading, but the majority of this activity would occur beyond the active river channel limits. Where excavation and grading are required in the active river channel, such as for canoe and kayak put-in sites, the associated effects would be local only. These effects include temporary increases in sediment during construction and limiting channel migration from hardscaping the put-in sites. However, these direct effects are considered to be less than significant because they are of short-term duration, and/or of local geographic extent. Indirect effects to sediment dynamics in the channel downstream of the recreation features would also be considered less than significant because of their limited geographic extent.

Lower Truckee River Reach

Hydrology

As an indirect effect to flood risk management features in the Truckee Meadows reach, this alternative would induce an additional 1,520 cfs of flow in the Truckee River downstream of Vista relative to benchmark conditions and during the modeled 1% annual chance event. Changes to the computed water surface elevations along the river channel during the modeled event are listed in Table 5-3. These additional flows could increase inundation of agricultural and other rural properties in various locations downstream of Vista. However, the hydraulic modeling has shown that there would be no increase in flooding in the commercial, residential, and industrial areas of this reach, including Lockwood and Wadsworth.

Based on an analysis of the changes in depth, duration, and frequency of flooding when compared to benchmark conditions in this reach, induced flooding (in terms of depth, duration, and frequency) resulting from this alternative could effect several agricultural and vacant parcels in this reach such that economic damages may be sustained and a taking of portions of these parcels may be required. This would be considered a significant indirect effect. Detailed discussion of this effect, as well as mitigation to reduce this effect to less than significant, is included in Section 5.8 Land Use.

Table 5-3. Changes to the Computed Water Surface Elevations Along the Lower Truckee River Reach for the Modeled 1% Annual Chance Event – Alternative 3-Floodplain Terrace Plan .

River Reach	Maximum Difference (ft)	Minimum Difference (ft)	Average Difference (ft)
UPRR at Lockwood to Long Valley Creek	0.68	0.26	0.49
Long Valley Creek to Tracy Gage	1.83	0.24	0.52
Tracy Gage to Derby Dam	1.13	0.32	0.73
Derby Dam to Wadsworth Gage	0.82	0.17	0.51
Wadsworth Gage to Marble Bluff Dam	0.69	0.18	0.47

Geomorphology

In the long-term, shifts in sediment aggradation and degradation in the Lower Truckee River reach would occur as an indirect result of this alternative; however, sediment budget analyses carried out on Alternative 3(d) and the Locally Developed Plan, whose flood risk management features would induce flows in the Lower Truckee River reach up to 3,300 cfs greater than the No Action condition in a 1% ACE event, indicated minor changes to the average annual volume of sediment transport (or yield) along the Lower Truckee River resulting from Alternative 3(d) and the Locally Developed Plan (USACE, 2008b). These minor changes in transport volume translate to a less than significant change to sediment distribution in the river. For the Floodplain Terrace Plan , induced flows during a 1% ACE flood event were modeled to increase by 1,520 cfs over the No Action condition in the Lower Truckee River reach. The sediment distribution changes for the Floodplain Terrace Plan are expected to be less than Alternative 3(d) and the Locally Developed Plan, which makes this a less-than-significant effect.

It is important to note that estimates of the effective discharge were made during the sediment budget analysis. The effective discharge is defined as the mean of the discharge increment that transports the largest fraction of the annual sediment load over a period of years. The effective discharge is one estimator of the channel-forming discharge. The channel-forming discharge is a theoretical discharge that if maintained over a long period of time would produce a stable channel geometry in a fully alluvial stream. Other estimators commonly used are the bankfull discharge and the discharge for a specific recurrence interval. The advantage of the effective discharge is that it is a calculated value not subject to

the problems associated with determining field indicators inherent in bankfull and recurrence interval methods.

In general, for both the No Action and Alternative 3(d) (as well as the Locally Developed Plan) conditions, the effective discharge between Vista and Marble Bluff Dam was estimated at around 3,000 cfs which roughly translates to approximately a 1/3 ACE event (i.e., about a 3-year event). Hydraulic modeling of the No Action and Floodplain Terrace Plan indicates no increases in flood discharges out of the Truckee Meadows for the 1/5 ACE event. Thus, significant long-term impacts in sedimentation due to the Floodplain Terrace Plan is considered unlikely since the effective discharge is not impacted by the project.

Truckee River Delta. Probable indirect effects on the geomorphology of the river delta where the Truckee River enters Pyramid Lake must be viewed in the context that the river is mostly sediment-starved. In addition, a likely existing source of sediment downstream of Marble Bluff Dam is due to bank erosion and channel incision. When combined with the potential sediment starved condition of flows over Marble Bluff Dam and the minor increase in flows, it can be reasoned that construction of flood risk management features may have a net erosive and redistributive effect at the Pyramid Lake delta, rather than resulting in increased deposition where the river enters the lake. This indirect effect would not be significant because of the low flow gradient in the delta area.

Alternative 2-Detention Plan

As described under the Floodplain Terrace Plan , under the Detention Plan , construction-related soil and channel disturbances would temporarily increase erosion potential along channel banks and upland areas, temporarily affecting sediment load within the river. This is considered a temporary effect that would be minimized with implementation of Best Management Practices presented in Section 5.4 Water Quality. This alternative is not expected to have a significant effect on reducing natural meander processes because of the channel's current constraints to migration by existing features constructed to protect the built environment, which includes roadways, buildings, water diversions, railroads, and utilities.

Truckee Meadows Reach

The direct effects of flood risk management features on hydrology for the Detention Plan would be similar to the Floodplain Terrace Plan with the addition of relocating the North Truckee Drain, and construction of the UNR Farms and Huffaker Hills detention basins.

Relocating the confluence of the North Truckee Drain downstream from Steamboat Creek would reduce the extent of the backwater experienced at the Steamboat Creek/ Truckee River confluence. Relocating the North Truckee Drain from the existing unimproved ditch with ruderal vegetation into the buried box culvert would likely increase the flow rate due to a decrease in tailwater, or stage, at the new confluence with the Truckee River. The increased flow rate during high flow events would be directed downstream of the constricted, existing channel area near the mouth of Steamboat Creek and the existing Reno-Sparks wastewater treatment plant. After the North Truckee Drain is relocated, it would divert water under normal conditions as well as during flood events.

The UNR Farms detention basin would be sited off stream and designed to attenuate the effects of the increased downstream flood flows from the project improvements. Flows from the Truckee River would be diverted into the UNR Farms Detention Basin by a 500 feet long weir located on the south (right) bank approximately 1,550 feet downstream from McCarran Boulevard. This facility would divert and temporarily store some of the Truckee River flood flows in order to reduce the peak discharge and volume of water carried downstream. This would reduce backwater accumulating upstream of the

Truckee River's natural constriction at the Vista reefs, reducing the water surface elevations during a flood in much of the Truckee Meadows area. The detention facility would also reduce peak discharge downstream from the reefs. Peak storage in the detention facility is estimated at approximately 5,300 acre-feet.

The Huffaker Hills detention basin would be sited on stream, located on Steamboat Creek, approximately 5 river miles upstream from the Truckee River confluence at Mira Loma Road. The maximum storage capacity of the facility would be about 1,002 acre-feet. This facility would temporarily store some of the Steamboat Creek flood flows in order to reduce the peak discharge and volume of water carried downstream to the confluence of the Truckee River. This would reduce backwater accumulating upstream of the Truckee River's natural constriction at the Vista reefs during floods, reducing the water surface elevations in much of the Truckee Meadows area.

As described under the Floodplain Terrace Plan , the proposed flood risk management features of the Detention Plan could have direct and indirect effects on channel stability and sedimentation in this reach. However, with the natural bed armoring, as well as existing constructed armoring, currently in place, and with the proposed scour protection features proposed as part of this alternative, effects to the river's existing geomorphologic condition in this reach would be considered less than significant.

Levee and On-bank Floodwall Construction. Similar to the effects described for the Floodplain Terrace Plan , levee and on-bank floodwall construction under the Detention Plan , including setback levee construction, would directly affect channel stability and sedimentation by direct alteration of the riverbank and/or upland areas receiving fill. These effects are considered to be of long term duration, of probable potential to occur, and of limited geographic extent. In addition, increased containment of flows during flood events caused by levee and on-bank floodwall construction would result in incrementally higher peak flows and velocities in areas adjacent to and downstream of the levees. The increased tractive force of higher peak flows can cause channel incision, but the natural channel bed armoring currently in place in this reach makes the potential for resulting future channel incision unlikely.

As with the Floodplain Terrace Plan , while future channel incision under the Detention Plan is minimal, the potential increase in scour when compared to existing conditions is sufficiently high enough at critical infrastructure locations that USACE conservatively has proposed scour protection measures at these locations, pending more detailed geotechnical analyses during the design phase of the project. The overall direct and indirect effect of levee and on-bank floodwall construction on fluvial geomorphology is considered to be less than significant in this reach.

In-channel Floodwall Construction. As with the Floodplain Terrace Plan , the Detention Plan would include placement of riprap armoring both above and below the streambed to prevent scour along the base of the floodwall. Local modification of fluvial geomorphology would occur where floodwalls are constructed, both indirectly in the footprint of the floodwall and where excavation for construction access and wall toe armoring (riprap) is required. Restoration of the stream bed would be implemented after wall and riprap placement.

As with on-bank levees and floodwalls, in-channel floodwall construction would result in higher peak flows and velocities in areas downstream. This increase in peak flows and velocities would increase potential for channel scour to occur, in turn affecting channel stability and sedimentation. In order to reduce this change in channel scour potential within the Truckee Meadows reach, bed, bank, and bridge pier scour protection has been included as a project feature at critical locations within this reach. See the discussion on scour protection features, below.

Although the effects of floodwall construction on fluvial geomorphology are considered to be of

probable potential to occur, of long term duration, and of extensive geographic extent, the implementation of scour protection features and restoration of the channel bed following floodwall installation would reduce these direct and indirect effects to less than significant.

Scour Protection Features. As with the Floodplain Terrace Plan , the construction of levees and floodwalls in the Truckee Meadows reach under the Detention Plan , has the potential to increase peak discharge, channel velocity, and channel shear stress in the project area and downstream. This could result in an increase in scour potential at certain critical locations along the river. Existing facilities that could be affected include the river bed and banks, bridges, diversions, and grade control structures.

Similar to the Floodplain Terrace Plan , the Detention Plan , also proposes use of riprap scour protection and bioengineered bank scour protection. Bridge scour protection is proposed at Glendale Boulevard, Greg Street, Rock Street, and E. McCarran Boulevard bridges. In addition, the Detention Plan , proposes the lengthening of McCarran Boulevard Bridge approximately 250 feet to the south.

The direct and indirect effects of of scour protection measures are considered to be of long term duration, of probable potential to occur, and of extensive geographical extent. However, given the river's current geomorphologic condition in the Truckee Meadows reach, and implementation of design features that would minimize effects to channel grade, contours, and capacity, as well as restoration of the channel to pre-project conditions to the extent practicable following construction, scour protection features would have less than significant direct and indirect effects on existing channel stability and sediment load in this reach.

Recreation Features. As with the Floodplain Terrace Plan , under the Detention Plan , effects associated with the installation of recreational features are considered to be of short-term duration, of probable potential to occur, and of local geographic extent. Such localized effects would be less than significant. Indirect effects of proposed recreation features to fluvial geomorphology would be considered minimal. Indirect effects of proposed recreation features to fluvial geomorphology would be considered minimal.

UNR Farms and Huffaker Hills Detention Basins. The Detention Plan , proposes construction of two new detention basins. The basins would serve to temporarily store peak flood flows in the Truckee Meadows and spread out the release of flood water downstream from the Truck Meadows over time so that downstream reaches would not experience significant increases in peak flood volumes over existing conditions. As a result, there would not be any adverse geomorphologic effects associated with construction of the detention basins. Because the detention basins would not store flood flows except for during the lowest frequency events, direct and indirect effects to the existing hydrology and geomorphology in this reach would be less than significant.

Lower Truckee River Reach

The flood risk management features in the Truckee Meadows reach would not affect the flows in the Lower Truckee River reach under normal flow conditions. However, these measures would have an indirect effect by increasing the flows for a 1% chance event. At the design flow event (1% chance of occurrence), the Detention Plan would induce an additional 1,823 cfs of flow above existing conditions in the Truckee River downstream of Vista. While this represents approximately 300 cfs more flow than the Floodplain Terrace Plan alternative, the two alternatives would be expected to have similar effects on hydrologic conditions in the Lower Truckee River reach.

In the long-term, shifts in sediment aggradation and degradation in the Lower Truckee River reach would also occur as a result of the Detention Plan; however, the sediment budget analysis described

above for Alternative 3-Floodplain Terrace Plan indicates a less than significant change to sediment distribution in the river.

Truckee River Delta. As with the Floodplain Terrace Plan , the indirect geomorphologic effect of the Detention Plan on the Truckee River Delta would not be significant because of the low flow gradient in the delta area.

5.3.3 Mitigation Measures

Alternative 3-Floodplain Terrace Plan and Alternative 2-Detention Plan

Hydrology

Interior drainage features proposed for each alternative would ensure that the existing flow of stormwater runoff into natural or constructed drainage areas would not be impeded by construction of levees and floodwalls. Interior drainage management systems would be constructed as part of the project to maintain the area's existing stormwater runoff drainage capacity. Interior drainage management measures typically include pumping stations and gravity drain lines with flap gates through levees/floodwalls. The Floodplain Terrace Plan would require 1 pump station in the Truckee Meadows reach and the Detention Plan could require the following interior drainage features in the Truckee Meadows reach: (1) a 14 cfs pump station located at the Wal-Mart parcel combined with two 42 inch flapgated gravity RCP's; (2) a pump station located on the west side of the detention basin embankment and east of South McCarran Boulevard (just south of Capital Boulevard) to convey runoff flows in the airport ditch into the detention basin; and, (3) a flapgated 2-foot gravity RCP to drain the commercial properties located behind a floodwall just upslope from the Huffaker Detention Basin flood pool.

Although the Floodplain Terrace Plan would induce flooding south of the UNR Farms area and north of I-80 along the North Truckee Drain, the frequency of occurrence would be so low that potential economic damages are too small to warrant implementation of hydraulic mitigation in these areas as part of the project. However, in order to maintain compliance with FEMA's National Flood Insurance Program (NFIP), the TRFMA would implement avoidance measures to avoid induced flood damages to these structures. While other measures could be pursued, currently the most likely actions to be implemented by TRFMA would be raising and flood-proofing structures in the area south of UNR Farms, and installation of a pump station north of I-80 in East Sparks.

The Detention Plan would not induce off-site flooding in the Truckee Meadows reach; however, both alternatives would induce flooding on agricultural and other rural locations to the same extent in the Lower Truckee River reach. A discussion of mitigation for induced flooding in the Lower Truckee River reach is included in Section 5.8 Land Use.

Geomorphology

General mitigation of impacts to fluvial geomorphology from proposed project measures would be to restore modified channel bed and bank surfaces to their pre-existing configurations after construction of improvements, to the extent practicable. Restoration would apply to areas of local construction excavation for such things as bridge pier footings, bridge abutments, floodwall footings, retaining wall footings, and culvert construction. Restoration would follow design guidelines consistent with the project's main goals, namely flood risk management and enhancement and expansion of recreational opportunities.

Proposed scour protection would minimize the effect that flood risk management features would have on existing river channel stability and sediment transport.

5.4 WATER QUALITY

5.4.1 Affected Environment

As the Truckee River flows from Lake Tahoe to Pyramid Lake, pollutants, including nutrients, turbidity, and TDS, resulting from natural erosion of the watershed and from the effects of humans, enter the river and degrade water quality. Additionally, water is diverted for agricultural and municipal and industrial uses and is returned to the river in diminished quantity and quality. Available data do not reveal any major sources of contamination other than erosion of the watershed, agricultural runoff, and wastewater treatment plant discharges (Interior and State of California, 2008).

Water quality conditions in the Truckee River are dependent upon the timing and quantity of watershed runoff, regulation of reservoir releases, inputs of municipal and industrial (M&I) waste within the urbanized areas of Reno and Sparks, reduction in flows as a result of municipal and agricultural diversions, and irrigation return flows in the lower river reaches.

Regulatory Setting

Water quality standards for surface waters are established and undergo regular review by state agencies and the USEPA. Criteria are established for each water body in order to protect beneficial uses that the resource provides. Beneficial uses include: agricultural, M&I supplies, fish and wildlife protection, recreation, navigation, and power generation. Ground water quality is generally regulated through land use planning processes, source control measures built into permitting mechanisms, and Federal and state drinking water quality standards once groundwater withdrawals are made for treatment and distribution.

Federal Clean Water Act

Growing public awareness and concern for controlling water pollution led to enactment of the Federal Water Pollution Control Act Amendments of 1972. This law became commonly known as the Clean Water Act (CWA) (33 U.S.C. §1251, et seq.). The CWA established the basic structure for regulating discharges of pollutants into the waters of the U.S. [6]

First, water quality standards consistent with the statutory goals of the CWA must be established. Then water bodies are monitored to determine whether the water quality standards are met. Water quality standards include three major components: designated uses, water quality criteria, and antidegradation provisions.

If all water quality standards are met, then antidegradation policies and programs are employed to keep the water quality at acceptable levels. Routine ambient monitoring of the chemical, physical, and biological condition of the aquatic environment is also needed to ensure that this is the case.

If the water body is not meeting water quality standards, a strategy for meeting these standards must be developed. The most common type of strategy is the development of a total maximum daily load (TMDL). TMDL's determine what level of pollutant load would be consistent with meeting water quality

[6] Waters of the U.S. are defined as: all waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that 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 and ephemeral streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes or natural ponds, where the use, degradation, or destruction of which could affect interstate commerce; impoundments of these waters; tributaries of these waters; or wetlands adjacent to these waters (33 C.F.R. §328).

standards. TMDL's also allocate acceptable loads among sources, such as point and non point sources, of the relevant pollutants.

According to the USEPA, the term "nonpoint source" is defined to mean any source of water pollution that does not meet the legal definition of "point source" in section 502(14) of the CWA (33 USC §1362(14), which states: "the term 'point source' means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigated agriculture." Nonpoint source pollution is generally the result of land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification (USEPA, 2010a).

Necessary reductions in pollutant loading are achieved by implementing strategies authorized by the CWA, along with any other tools available from Federal, state, and local governments and nongovernmental organizations. Key CWA sections include the following:

- Section 303(d) of the CWA (33 U.S.C. §1313(d)) requires states, territories, and authorized tribes to develop a list of water-quality limited segments of rivers and other water bodies under their jurisdiction. These waters on the list do not meet water quality standards, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority ranking for waters on the list and develop TMDLs to improve water quality. The Nevada Division of Environmental Protection's (NDEP) Bureau of Water Quality Planning administers this permit program for Nevada.
- Section 305(b) of the CWA (33 U.S.C. § 1315(b)) requires submittal of a biennial National Water Quality Inventory Report to Congress. The report is the primary vehicle for informing Congress and the public about general water quality conditions in the United States. Each State submits an assessment report to EPA, which is summarized in the report to Congress. This document characterizes the nation's water quality, identifies widespread water quality problems of national significance, and describes various programs implemented to restore and protect waters. NDEP prepares a Water Quality Integrated Report that combines waterbody assessments and reporting requirements for Sections 303(d), 305(b), and 314 of the CWA. The most recent report submitted is the Draft Nevada's 2008-10 Water Quality Integrated Report (NDEP 2012).
- Section 402 of the CWA (33 U.S.C. §1342) addresses the National Pollutant Discharge Elimination System (NPDES) permit program, which covers point sources of pollution discharging into a surface water body. NDEP's Bureau of Water Pollution Control administers this program in Nevada.
- Section 319 of the CWA (33 U.S.C. §1329)addresses nonpoint sources of pollution, such as most farming and forestry operations, largely through grants. NDEP's Bureau of Water Quality Planning administers this discretionary compliance program in Nevada.
- Section 404 of the CWA (33 U.S.C. § 1344) regulates the placement of dredged or fill materials into wetlands and other waters of the U.S. USACE' Sacramento District Regulatory Division administers this permitting program in Nevada. A discussion of effects to waters of the U.S. as it relates to CWA Section 404 requirements can be found in Section 5.5 Vegetation and Wildlife.
- Section 401 of the CWA (33 U.S.C. § 1341) requires Federal agencies to obtain water quality certification from the state, territory, or Indian tribes before issuing permits that would result in increased pollutant loads to a water body. The water quality certification is issued only if such increased loads would not cause or contribute to exceedances of water quality standards. NDEP's

Bureau of Water Quality Planning administers this permit program for Nevada.

State of Nevada Water Quality Standards

Nevada's water quality standards are detailed in the Nevada Administrative Code (NAC) Chapter 445A.070 – 445A.2234. These sections of the NAC define the water quality goals for a water body, or a portion of a water body, by: (1) designating beneficial uses of the water; and (2) setting criteria necessary to protect the beneficial uses. Beneficial uses include, but are not limited to: irrigation, recreation, aquatic life, fisheries, and drinking water. State water quality standards are classified by narrative criteria and numeric criteria. In many instances, the NAC defines two or more reaches for a river system each having different beneficial uses and water quality standards.

Both narrative and numeric criteria are included in Nevada's water quality standards. Narrative standards are applicable to all surface waters of the state and consist mostly of statements requiring waters to be "free from" various pollutants including those that are toxic. Numeric standards for conventional pollutants are broken down into types: class and water body specific (NDEP, 2009). For class waters, criteria for various pollutants are designed to protect the beneficial uses of classes of water, from A to D; with class A being the highest quality. The water bodies belonging to these classes are named in the regulations.

For major water bodies in Nevada, site-specific numeric standards have been developed. These standards include both criteria designed to protect the beneficial uses and antidegradation requirements. Antidegradation is addressed through the establishment of "requirements to maintain existing higher quality" (RMHQ). RMHQs are set when existing water quality (as evidenced by monitoring data) for individual parameters is higher than the criteria necessary to protect the beneficial uses. This system of directly linking antidegradation to water quality standards provides a manageable means for implementing antidegradation through the permit program and other programs. The Truckee River and Steamboat Creek have site-specific standards (NAC Chapter 445A.1622 – 445A.1764).

Pyramid Lake Paiute Tribe Water Quality Standards

The PLPT has established water quality standards for the lower Truckee River on the PLPT's reservation land under authority granted by the USEPA. Prior to the development of the water quality standards by the PLPT, NDEP had developed water quality standards for the lower Truckee River, which were protective of Pyramid Lake. In 2001, the PLPT established the final water quality standards that are protective of both the lower river and Pyramid Lake and submitted them to the USEPA for review and approval. In addition to NDEP's water quality standards, the PLPT added additional requirements. These standards include 36 additional constituent toxins and 19 proposed toxins, which are at more restrictive levels than required by NDEP.

On January 30, 2007, the PLPT received Treatment As State status pursuant to CWA Section 303 Water Quality Standards and CWA Section 401 Certification by the USEPA. The final version of the Water Quality Control Plan (WQCP) was reviewed by the Tribal Interdisciplinary Team and approved by the Pyramid Lake Tribal Council on September 19, 2008. The Tribe received final approval from EPA for the WQCP on December 19, 2008.

The PLPT water quality standards are defined in the tribe's September 19, 2008 Water Quality Control Plan (PLPT 2008). The PLPT has adopted both numerical and narrative water quality criteria, as well as establishing numeric water quality antidegradation standards for certain parameters for the higher quality waters within Tribal jurisdiction on the lower Truckee River. Narrative standards apply to Pyramid Lake, the lower Truckee River, and tributaries or wetlands to these water bodies. Narrative standards are established for: coliform bacteria, bioaccumulation, biostimulatory substances, chemical

constituents, color, floating materials, oil and grease, pesticides, radioactivity, sediment and turbidity, species composition, taste and odor, temperature, and toxicity. Numeric standards are established for alkalinity, color, chlorides, fecal bacteria, dissolved oxygen, pH, dissolved reactive phosphorus, nitrogen species, suspended solids, sulfate, sodium, temperature, change in temperature, TDS, turbidity, aluminum, ammonia, boron, chlorine, cobalt, cyanide, fluoride, iron, manganese, molybdenum, sulfide, nitrite, vanadium, toxic organic pollutants and toxic metal pollutants.

Tribal antidegradation standards are consistent with State of Nevada RMHQ values provided by the February 2003 NAC 445A. 189-190, for waters of the lower Truckee River within the exterior boundaries of the Pyramid Lake Indian Reservation. The PLPT has CWA 401 Certification authority within the exterior boundaries of the Pyramid Lake Indian Reservation boundaries.

Existing Water Quality Conditions

The beneficial uses identified in the NAC from Idlewild Park to Wadsworth for the Truckee River are irrigation, watering of livestock, water contact and non-contact recreation, M&I supplies, propagation of wildlife, and propagation of aquatic life. In addition to the beneficial uses identified by the State, the PLPT has identified the following in their 2008 WQCP for the Truckee River, Pyramid Lake, and/or perennial streams within the Tribal Reservation boundaries: aquaculture; cold freshwater habitat; extraordinary aesthetic value; freshwater replenishment; groundwater recharge; indigenous aquatic life; maintenance and restoration of native fish species; primary contact ceremonial use; rare, threatened and endangered species; riparian habitat; sport fishing; spawning, development, and recruitment; wetland habitat; water quality enhancement; and water of special ecological significance (PLPT, 2008). Below is a discussion of the current surface and ground water quality conditions in the project area and identification of existing pollutant sources that are affecting the achievement of State and PLPT water quality standards.

Surface Water Quality

Flow is the most important variable affecting Truckee River water quality. Typically, wet hydrologic conditions provide the best water quality, and dry hydrologic conditions provide the worst. Currently, warm temperatures for fish and water quality problems exist minimally in wet, and mostly in median and dry hydrologic conditions. The most severe conditions occur in dry hydrologic conditions. Current system operations (pre-TROA) do not adequately accommodate water quality (Interior and State of California, 2008). Water quality tends to be worse during the warm summer and early fall months. On the basis of summaries of modeled output for the TROA EIS/EIR, under current conditions in dry years, annual summaries indicated that standards for TDS and chloride concentrations to Pyramid Lake, a terminal saline desert lake, are exceeded most of the year. Total nitrogen standards in the reach from Lockwood to Derby Diversion Dam are exceeded about one-third of the year. Under TROA in dry years, annual summaries indicated that TDS and chloride concentration standards would be exceeded less often than under current conditions. Total nitrogen standards in the reach from Lockwood to Derby Diversion Dam would be exceeded less than one-sixth of the year (Interior and State of California, 2008).

Reno to Wadsworth

The Truckee River reaches within the project area have impaired water quality. Table 5-4 summarizes the Truckee River Basin impaired reaches within the project area as shown in Nevada's 2008-10 Water Quality Integrated Report (NDEP 2012), and indicates the NAC section that presents the numeric water quality standards established for the waterbody segment.

The reach of river from East McCarran Boulevard to the Lockwood bridge was assessed as a Category 4A water, which indicates that it is impaired for one or more designated uses, but a TMDL is

not necessary because a State developed TMDL has been approved by EPA or a TMDL has been established by EPA for any segment-pollutant combination. From Reno to Wadsworth, the primary water quality concerns are warm temperatures and turbidity.

Table 5-4. Nevada's 2008-10 Category 5 (303(d)) Impaired Waters List in the Project Area.

Waterbody	Water Quality Standards	Size	Water Name - Description	Parameter Not Supporting Beneficial Uses	Parameter Requirements To Maintain Existing Higher Quality
Truckee River	NAC 445A.1686	5.8 miles	Truckee River - From Idlewild to East McCarran Blvd	Temperature, water	No Change in Water Temperature
Truckee River	NAC 445A.1688	14.3 miles	Truckee River - From Lockwood to Derby Dam	Turbidity	Annual Average ≤ 8.0 NTU
				Temperature, water	No Change in Water Temperature
Truckee River	NAC 445A.1692	9.2 miles	Truckee River - From Derby Dam to Wadsworth	Temperature, water	No Change in Water Temperature
				Turbidity	Single Value ≤ 10.0 NTU
Steamboat Creek	NAC 445A.1726	12.5 miles	Steamboat Creek - From gaging station number 10349300, located in the S 1/2 of section 33, T. 18 N., R. 20 E., to its confluence with the Truckee River	Boron	750 micrograms/ liter
				Arsenic	150 micrograms/ liter (96-hour avg.)
				Zinc	$(0.986) \times e^{(0.8473\{\ln(\text{hardness})\} + 0.884)}$
Sparks Marina	NAC 445A.187	77 acres	Sparks Marina - The entire reservoir	Nitrogen (Total)	Annual Average ≤ 0.75 mg/l
				Phosphorus (Total)	Annual Average ≤ 0.05 mg/l
				Total Dissolved Solids	Annual Average ≤ 210.0 mg/l Single Value ≤ 260.0 mg/l
Tracy Pond	NAC 445A.1764	30 acres	Tracy Pond - The entire area	pH	Single Value between 6.5 and 9.0

Sources: NDEP 2012; Nevada Administrative Code Chapter 445A.070 – 445A.2234
NAC = Nevada Administrative Code; NTU = nephelometric turbidity units;

In warm weather, temperatures gradually increase downstream, especially in the flatter reach downstream from Reno, where flow velocities are slower (Interior and State of California, 2008). Water temperature increases as a result of natural thermal warming, the Tracy Power Plant discharge, and gravel mining operations. Warm temperatures and slower velocities allow algae attached to the river bottom to accumulate, increasing organic matter. Decay of organic matter can result in low concentrations of dissolved oxygen (DO). Nutrients, which are abundant downstream from the TMWRF, help stimulate excessive algal growth in the Truckee River. Excessive algal growth downstream from Derby diversion

dam also causes low DO concentrations (Interior and State of California, 2008).

The Category 5 list also identified turbidity as a stressor of concern in the Lower Truckee River reach from Lockwood to Wadsworth. Turbidity measurements give an indication of the overall water quality because phytoplankton, sediments from erosion, re-suspended sediments from the bottom, waste discharge, algal growth, and urban runoff are all factors that increase in turbidity. Increased turbidity increases water temperature, which reduces DO. As turbidity increases, algae and other plants become less productive photosynthesizers, which in turn lowers DO concentration even more. These suspended particles eventually settle to the bottom and cover and suffocate fish eggs and insect larvae; gill structures get clogged or damaged. In addition, heavy metals and many other toxic organic compounds and pesticides attach to the particles (Lenntech, 2006).

TMDLs were established for the Truckee River in 1994 to control total nitrogen, total phosphorus, and TDS from East McCarran Boulevard to Wadsworth. The total nitrogen and total phosphorus TMDLs were developed due to the presence of low DO concentrations in the lower river. The TDS, or salinity, TMDL was established to be protective of Pyramid Lake and lower Truckee River loadings. These TMDLs have been incorporated into the NPDES permit for the TMWRF.

NDEP has designated Lockwood as the TMDL compliance point on the Truckee River, since the majority of controllable, point-source pollutant sources (Steamboat Creek, North Truckee Drain, and the TMWRF) are upstream of Lockwood. The TMDL's established are:

- TDS – 900,528 pounds per day
- Total Nitrogen – 1,000 pounds per day
- Total Phosphorus – 214 pounds per day

In addition, Steamboat Creek was included on the Category 5 list for zinc, arsenic, and boron. TMDLs have not yet been established for these pollutants. The lower portion of Steamboat Creek is designated as a Class D water where the beneficial uses include aquatic life, propagation of wildlife, irrigation, watering of livestock, industrial supply, and recreation not involving contact with the water. Historic mining and milling activities as well as natural sources, such as metal-bearing rock formations and geothermal springs, are associated with high metal levels. Geothermal systems in the Reno/Sparks area contribute arsenic and boron by way of springs and shallow water-table aquifers connected to surface waters (USGS 1998b).

Steamboat Creek contributes arsenic, iron, zinc, and boron to the Truckee River. Other significant constituents conveyed by the tributary include nitrogen, phosphorus, and chloride (Washoe-Storey Conservation District, 2000). Boron, arsenic, chloride, and TDS are strongly associated with the Steamboat Hot Springs area, with concentrations being highest immediately downstream of the springs. Constituent concentrations decrease downstream from the Steamboat Hot Springs due to dilution from downstream tributaries (Washoe-Storey Conservation District, 2000).

Elevated levels of mercury occur in sediment below the Steamboat Creek/Truckee River confluence. Steamboat Creek transports mercury, from both natural and man-made sources associated with geothermal and mineral resources (USGS 1998b). Total mercury concentrations in water upstream of the Steamboat Creek confluence were within the range of pristine water, while total mercury concentrations in water downstream of the Steamboat Creek confluence exceeded pristine values (Thomas, 2003). Since 1995, NDEP has monitored Truckee River water as it enters the Truckee Canal. Mercury has not been detected in any of the samples collected, suggesting that total mercury is at very

low levels (< 0.1 to 0.5 μg/L) in the canal (NDEP, 2005). This correlates with the data collected by Thomas (2003). Cadmium, chromium, copper, lead and zinc had higher concentrations in both surface water and sediment samples downstream from the Reno-Sparks area than upstream. However, none of these concentrations exceeded water quality criteria. Monitoring data from the Truckee Canal also do not show exceedences.

Pyramid Lake Paiute Indian Reservation

The overriding consideration for water quality conditions of the Truckee River within the Pyramid Lake Paiute Indian Reservation is criteria to support rearing and spawning habitat for the threatened LCT and endangered cui-ui fish species. TDS concentrations in the Truckee River increase downstream and are a concern because Pyramid Lake, the terminus of Truckee River, is a saline lake (Interior and State of California, 2008). Both temperature and TDS affect density stratification of the water layers of Pyramid Lake. Long periods of stratification lead to oxygen-deficient bottom waters, which stress cold water organisms. Below-average freshwater flows and high evaporation rates increase TDS concentrations in the surface waters of the lake and can facilitate early turnover by increased mixing, which replenishes oxygen-deficient bottom waters. Above-average freshwater inflow can dilute the salinity of surface waters so that mixing of Pyramid Lake during winter might be physically impossible due to density differences. However, a steady decline in the elevation of Pyramid Lake would also reduce the probability of mixing events (Interior and State of California, 2008).

The implementation of the TMDLs changed the focus of water quality regulation of TDS and other pollutants. Originally the focus was directed toward the concentration of salts and other pollutants in the Truckee River as the seasonal flow volume changed during the year. The TMDLs have since been refocused on the actual amount of salts and other pollutants that are deposited in Pyramid Lake.

Pyramid Lake, the terminus for the Truckee River, is moderately saline. The lake is a desert lake and is the evaporative terminus of the Truckee River. When the water in the lake evaporates, salts are left behind. Salt concentrations need to be regulated to maintain the viability for the lake as a fishery resource. Salt concentrations in the lake are controlled by freshwater inflows, primarily from the Truckee River.

Groundwater Quality

In general, all groundwater basins in the project area are considered to be a potential drinking water source, in accordance with the Federal Safe Drinking Water Act standards (USGS 1998b). Groundwater quality ranges from poor to excellent within the Reno/Sparks area. Like surface water, the biggest groundwater quality issues are the result of widespread pollution sources. Urban, suburban, farming, mining, and industrial areas all contribute petroleum chemicals, solvents, metals, nutrients, dissolved salts, pesticides, and pathogenic bacteria that eventually reach the groundwater supply (USGS 1998b).

According to the Washoe County 208 Water Quality Management Plan, the key issues affecting ground water quality in the Truckee Meadows Basin are solvent and fuel contamination and septic system density. Naturally occurring, poor-quality groundwater due to geochemistry or geothermal influences also occurs.

The two primary sources of industrial contamination that have affected groundwater quality in the Truckee Meadows are perchloroethylene (PCE) solvent contamination and petroleum contamination from the Sparks Solvent/Fuel Site. PCE solvent contamination affect discrete areas of the downtown Reno corridor, certain areas in Sparks, as well as some outlying areas (TMRPA, 2007). PCE is an organic man-made chemical, which has been a popular solvent for dry cleaning and other purposes. In 1995, health

officials determined that the soil and groundwater in certain areas of the Truckee Meadows were contaminated and needed to be cleaned to ensure protection of public health. The Central Truckee Meadows Remediation District was created in 1995 to address the PCE contamination of the Central Truckee Meadows aquifer and to prevent future occurrences. Equipment on TMWA wells has been treating PCE to non-detectable levels since 1995 (TMWA, 2008).

The Sparks Solvent/Fuel Site is a railyard and fuel terminal tank farm in Sparks, Nevada. Activities over the past century have led to contamination of groundwater and soils by gasoline solvents, diesel fuels, and other petroleum products. To date, cleanup efforts have involved the design, installation, and operation of a groundwater extraction and treatment system, soil vapor extraction and treatment systems, and several additional aggressive remediation technologies. Since the start of the site-wide remediation system, approximately 400,000 gallons of petroleum hydrocarbons have been removed from the subsurface. The contamination is being contained, so the contaminants do not pose a threat to the Truckee River, the Sparks Marina, area groundwater supplies, or local water resources. Monthly testing is conducted on the treated groundwater to ensure contaminants are not being discharged to the Truckee River. The remediation system will continue to operate until cleanup is completed to the satisfaction of the NDEP.

Increasing levels of nitrates in groundwater are also a growing concern in the Reno/Sparks area. Of special concern are subdivisions on septic systems that use local groundwater sources for domestic or community drinking water supply. Septic system seepage is a major source of recharge, particularly in the southern part of Truckee Meadows, and contributes to elevated nitrates in the project area (USGS 2010).

Geothermal activity in south Truckee Meadows results in poor-quality groundwater. TDS, minerals, and metals such as arsenic and iron are the primary concern. The region's groundwater supplies are limited in part due to the influence of geothermal systems. Arsenic is elevated near or above the maximum contaminant level for Federal drinking water standards in much of the area (USGS 2010).

In the lower Truckee River, the groundwater resources have significantly higher concentrations of TDS than the upper reaches. Recent studies conducted by DRI, Washoe County researchers, and several private consultants indicate that groundwater carries natural mineralization and is responsible for salinity loading in the lower Truckee River. Current studies also indicate that a significant portion of the groundwater is driven by irrigation activities in the watershed (DRI, 2002).

5.4.2 Environmental Consequences

This section evaluates the effects of the proposed alternatives on the water quality conditions of surface and underground water in the project area. Qualitative effects on water quality were based on construction practices and materials, location, and duration of construction. Standard pollution prevention measures would be implemented as part of the project design, including erosion and sediment control measures, proper control of non-stormwater discharges, and hazardous spill prevention and response measures.

Significance Criteria

Direct and indirect effects on water quality and waters of the U. S. may be considered significant if implementation of an alternative plan would result in any of the following:

- Substantially degrade surface water or groundwater quality such that it would violate criteria or objectives identified in the NAC or the PLPT WQCP, or otherwise substantially degrade water quality to the detriment of beneficial uses.

- Substantially alter the existing drainage pattern of the area, including through the alteration of the course of a stream, in a manner which would result in substantial erosion or sedimentation on- or offsite.
- Disturb existing channel banks, channel beds, or levees to the extent that erosion and sedimentation could be accelerated.

Significance criteria for placement of fill material in waters of the U.S. are included in Section 5.6 Vegetation and Wildlife.

No Action Alternative

Under the No Action Alternative, no Federally funded flood risk management improvements would take place in the project area.

Surface Water Quality

If no federal action is taken, there would be a continued high risk of flooding and water quality could be adversely affected due to increases in total suspended solids and turbidity. Additionally, adverse water quality effects due to flooding in the study area would likely be considerable and could include bacterial and chemical (e.g., pesticides, petroleum products, heavy metals) contamination.

With implementation of TROA, water stored in Truckee River reservoirs in wet and median years would be used to improve riverine water quality in dry years, the most critical periods for aquatic resources, including fish (TROA, 2008). In general, greater inflow to Pyramid Lake and the resulting higher elevation and greater volume under TROA would be favorable for water quality.

Ecosystem restoration projects proposed for implementation by other Federal agencies and non-Federal organizations, such as TNC and the PLPT, would be expected to improve surface water quality, particularly in terms of temperature, DO, and TDS. However, these projects would be dependent on securing funding sources.

Groundwater Quality

Under the No Action Alternative, groundwater quality is expected to stay the same. Groundwater supplies would continue to be used to varying degrees, depending on developing water use trends. Mitigation and remediation efforts have been implemented to address water quality issues that include groundwater discharge permitting and requirements, the development of Wellhead Protection Plans, and active aquifer recharge. In addition, the Central Truckee Meadows Remediation District was created to address the PCE contamination of the Central Truckee Meadows aquifer and to prevent future occurrences of contamination (Washoe County, 2007).

Alternative 3-Floodplain Terrace Plan

Truckee Meadows Reach

Ground disturbing activities and minor alterations to local drainage patterns in the upland areas of the project could cause a temporary increase in sedimentation and turbidity levels in the Truckee River. Because this alternative would disturb more than 1 acre of land, a NPDES construction stormwater permit would be required, which would be acquired from NDEP for compliance. Obtaining coverage under the NPDES permit requires that the project applicant prepare a Stormwater Pollution Prevention Plan (SWPPP) that describes the BMPs that will be implemented to control accelerated erosion, sedimentation, and other pollutants during and after project construction. The specific BMPs that will be incorporated into the SWPPP would be determined during the final stages of project design. However, the SWPPP

would likely include many of the BMPs listed in Section 5.4.3 Mitigation Measures to substantially reduce the potential for erosion and sedimentation as a result of ground and vegetation disturbance to less than significant.

In addition, small volumes of petroleum products (fuel, engine oil, and hydraulic line oil) would be temporarily used and handled to operate the construction equipment. These materials could be released in accidental spills. The waterside construction could present a direct release of petroleum products through general operation of construction equipment or an accidental spill. However, as required by Federal and State regulations, a Hazardous Materials Management Plan would be developed by the construction contractor and approved by NDEP prior to the start of construction. The plan would include BMPs to (1) reduce the likelihood of spills of toxic chemicals and other hazardous materials during construction; (2) describe a specific protocol for the proper handling and disposal of materials and contingency procedures to follow in the event of an accidental spill; and, (3) describe a specific protocol for the proper handling and disposal of materials should materials be encountered during construction. Any spills of hazardous materials into the Truckee River or its tributaries would be cleaned up immediately with notifications provided to NDEP and USFWS.

Implementation of appropriate BMPs outlined in an approved Hazardous Materials Management Plan would reduce the potential of effecting water quality from construction-related hazardous material spills. Short-term, construction related direct and indirect effects to water quality as a result of accidental spills of hazardous materials would therefore be considered less than significant.

No adverse effects to ground water are anticipated due to construction activities. However, PCE and solvent contamination affect discrete areas of the downtown Reno corridor, certain areas in Sparks, and some outlying areas (Washoe County, 2007). Construction activities that require dewatering would be required to test the groundwater for PCE contamination. The test results would be used to assess the need and type of proper treatment of contaminated water prior to discharge. No long-term direct or indirect effects on groundwater quality are expected to result from the project.

Upland Flood Risk Management Features. Construction of flood risk management features would require ground disturbance to approximately 85 acres of upland area. In this context upland is considered land above the ordinary high water mark elevation and generally outside of the riparian vegetation associated with the river. On-bank levees and floodwalls along the north bank of the river would be generally set back approximately 25 feet from the stream channel. On-bank levees and floodwalls constructed along the south bank from Highway 395 to East McCarran Boulevard would be set back at least 25 feet from the stream channel, with the setback levees between Glendale Boulevard and E. McCarran Boulevard constructed between 200 feet and 2,000 feet away from the existing channel.

To the extent practicable, ground disturbance caused by construction of flood risk management features would be revegetated after construction with appropriate riparian vegetation, but within limitations of USACE policies governing vegetation on and near levees, embankments, and floodwalls.

Implementation of appropriate BMPs, including reestablishment of native vegetation following construction, to be identified in the SWPPP and Hazardous Materials Management Plan would reduce the temporary direct and indirect effects on water quality of construction-related ground disturbing activities and potential spills to less than significant.

Floodplain Terrace Features. Floodplain terraces constructed from Glendale Boulevard to E. McCarran Boulevard would disturb approximately 66 acres, primarily of upland area (52.4 acres) outside of the river's riparian zone. As with the upland flood risk management features discussed above, ground disturbing activities and alterations to local drainage patterns could indirectly cause a temporary increase

in sedimentation and turbidity levels in the Truckee River. However, implementation of BMP's to be identified in the SWPPP and Hazardous Materials Management Plan would reduce potential temporary, construction related, indirect effects on water quality to less than significant. In addition, the floodplain terrace features would incorporate an environmentally sustainable design that reestablishes native riparian habitat along the terraces while maintaining the flood risk reduction performance designed for this reach.

In-channel Flood Risk Management Features. Flood risk management features requiring construction that is below the ordinary high water mark could result in a plume of sediments generated from the channel bottom and the channel side becoming suspended in the water. This could generate turbidity levels during construction that are above those identified as acceptable by the NDEP (The NDEP identifies an increase of 10 NTUs above background as significant). The flood risk management measures that would require in-channel work would include approximately 5,950 feet of in-channel flood walls, 12,850 feet of bank scour protection, and bridge scour protection at Glendale Boulevard, Greg Street, Rock Street, and E. McCarran Boulevard bridges.

In order to avoid or minimize the direct effect of temporary increase in turbidity within the river, coffer dams would be installed for construction of all features requiring in-channel work to isolate construction activities from the flow of water. Although BMPs such as barriers, silt fencing, slope roughing/terracing, and dust control would be implemented to avoid or minimize movement of soils into the water, there would be some temporary increase in turbidity in the river exceeding background levels.

However, this direct increase in turbidity levels would not be considered significant because the turbidity and settleable solids would be monitored and construction would be slowed or stopped if turbidity nears regulation thresholds. Turbidity levels would return to pre-project conditions once the project is completed. BMPs would be used to avoid or reduce, to a reasonable level, any adverse direct or indirect effects on water quality (see Section 5.4.3 Mitigation Measures).

Short-term, construction-related direct and indirect effects to water quality resulting from placement of approximately 3,200 feet of the North Truckee Drain into buried box would be avoided by constructing the new features in the dry.

Construction would take place during the dry season. Any existing drainage water in the North Truckee Drain would be diverted around the construction segments with the use of cofferdams and temporary pipes. The North Truckee Drain concrete headwall and riprap apron to be constructed at its exit to the Truckee River, would also be constructed in the dry by construction at low-flow conditions or by installation of temporary cofferdams.

As with construction of the upland flood risk management features, use and handling of hazardous materials presents the possibility of accidental spills. However, implementation of appropriate BMPs outlined in an approved Hazardous Materials Management Plan would reduce the potential of directly and indirectly effecting water quality from construction-related hazardous material spills. Short-term, construction related effects to water quality as a result of accidental spills of hazardous materials would be considered less than significant.

Long-term Effects of Scour Protection on Water Quality. Revetments constructed of riprap generally have only minor direct and indirect effects upon water quality. Long reaches of continuous riprap armor can increase stream temperatures due to solar radiation but these effects are likewise generally minor.

Careful planning can minimize direct and indirect effects due to construction, and design features can often be incorporated into riprap structures that will improve their habitat value. Stabilizing stream

channels with riprap can reduce sediment loads, improve water quality, and allow reestablishment of riparian vegetation. Stone used in riprap structures provides hard substrate habitat that can be important in some sand bed streams where it might be limited, and spaces between riprap stones provide velocity refuge and cover for aquatic invertebrates and small fishes.

Bioengineered slope stabilization techniques, in general, have effects similar to those for armor (riprap) techniques. They reduce channel evolution through migration, and can reduce most riparian succession processes unless they incorporate vegetation as a component of the slope stabilization. Even in that instance, large woody debris recruitment may be limited if the stabilization measure persists for a long period of time.

Bioengineered slope stabilization often employs vegetation, which can increase resistance relative to riprap. The habitat effects associated with bioengineered slope stabilization techniques are similar to those for revetments, except that those measures that include vegetation as a key component of the slope stabilization generally have lower effects on riparian flora and fauna than do revetments. The effects of slope stabilization measures upon chemical processes and pathways are essentially the same as those for an armor layer, except nutrient dynamics are less affected in slope stabilization projects when vegetation is used to stabilize the upper slopes.

To the extent practicable, design measures would be incorporated into scour protection features to improve habitat value and further minimize effects to water quality. These features could include willow pole cuttings, joint plantings, bank shaping and planting, brush mattresses, and wing deflectors, among others. In addition, sediment transport and stability evaluations to be completed during the project design phase would determine more specifically where and what type of bank protection would be required in conjunction with development of construction design level hydraulic models following project authorization. This is expected to reduce the amount of bank scour protection needed as well as increase the suitability of bioengineered scour protection features at more locations.

The long-term direct and indirect effects of scour protection features on water quality of the Truckee River is expected to be less than significant.

Recreation Features. Recreation features would primarily occur within the footprint of flood risk management features proposed for this alternative, particularly new walking trail features. The parking areas and picnic features would be located in upland areas that would be part of the flowage easement requirement of the flood risk management features. Construction of the fishing sites and the canoe and kayak put-in sites could result in temporary and localized erosion and sedimentation that could increase turbidity. However, any potential erosion would be reduced to less-than-significant with BMPs. Long-term direct and indirect effects to water quality from these river access sites would be less than significant.

Lower Truckee River Reach

Construction of project features in the Truckee Meadows reach could have a short term indirect effect to water quality conditions in the Lower Truckee River reach. Although BMPs such as barriers, silt fencing, slope roughing/terracing, and dust control would be implemented to avoid or minimize movement of soils into the water, there would be some temporary increase in turbidity in the river exceeding background levels.

However, this indirect increase in turbidity would be monitored and construction would be slowed or stopped if turbidity nears regulation thresholds. Turbidity levels would return to pre-project conditions once the project is completed. Monitoring of turbidity levels in addition to implementation of

BMPs during construction would avoid or reduce, to a less-than-significant level, any short-term indirect effects on water quality in the Lower Truckee River reach (see Section 5.4.3 Mitigation Measures).

This plan is expected to result in increased flows in the Lower Truckee River reach (see Section 5.3 Geomorphology). Increased flows could result in increased turbidity during peak flow events, but could also have positive effects such as reducing water temperatures and increasing dissolved oxygen levels. Overall, the increases in flow are expected to have a less than significant effect on turbidity and total dissolved solids when compared to existing conditions because of the negligible increase in effective flow and minor increase in flows (additional 1,520 cfs flows above existing conditions) under the infrequent 1% ACE flood event occurrence.

While construction of in-channel features such as scour protection and in-channel floodwalls could have a long-term effect on water temperatures in the Truckee Meadows reach, implementation of revegetation measures in disturbed areas, particularly within the floodplain terraces, and incorporation of bioengineering techniques in scour protection features should avoid or minimize long-term effects to water temperature, both within the Truckee Meadows reach and indirectly in the Lower Truckee River reach. Therefore, long-term, indirect effects to water temperature in the Lower Truckee River reach would be less than significant.

Alternative 2-Detention Plan

As with the Floodplain Terrace Plan , the Detention Plan is also expected to result in increased flows in the Truckee River (see Section 5.3 Geomorphology). Increased flows could indirectly result in increased turbidity during peak flow events, but could also have positive effects such as reducing water temperatures and increasing dissolved oxygen levels.

Truckee Meadows Reach

This alternative includes flood risk management features that would have short-term adverse affects on water quality. The flood risk management measures that require in-water work include in-stream flood walls, bank protection, and culverts.

Ground disturbance activities and minor alterations to local drainage patterns in the project area would directly and indirectly cause a temporary increase in sedimentation and turbidity levels that would be mitigated to less than significant with the implementation of BMP's. Where applicable, ground disturbance caused by construction of flood risk management features would be revegetated after construction with appropriate riparian vegetation, but within limitations of USACE policies governing vegetation on and near levees, embankments, and floodwalls.

Relocating the confluence of the North Truckee Drain downstream from Steamboat Creek would reduce the extent of the backwater experienced at the Steamboat Creek/ Truckee River confluence. The channel would be placed in a buried box culvert, 20 feet in width by 10 feet in height for a length of approximately 5,000 lineal feet and the containment feature along the remainder of the channel will be floodwalls. A concrete exit channel will be constructed for about 500 feet upstream of the mouth of the channel at its exit at the Truckee River. The purpose of the channel re-alignment is to relocate the runoff contribution of the North Truckee Drain watershed to downstream of the constricted existing channel area near the mouth of Steamboat Creek and the existing Reno-Sparks wastewater treatment plan. Relocating the North Truckee Drain would divert water from the existing drain into the buried box culvert. Although the existing drain could be considered a low quality aquatic habitat with degraded functional values, this diversion would cause the loss of any functional values that currently exist in the drain. The new box culvert would greatly reduce or eliminate the amount of natural river habitat available in the drain for native fish and other aquatic species. The loss of aquatic habitat would be mitigated to less than

significant with the creation of new riparian and riverine habitats throughout the projects reach.

The UNR Farms detention basin would be sited off stream and designed to attenuate the effect of the increased downstream flood flows from the project improvements. The detention basin would include a reinforced concrete inlet weir, a reinforced concrete outlet weir, and a levied storage area. Flows from the Truckee River would be diverted into the UNR Farms Detention Basin by a 500 feet long weir located on the south (right) bank approximately 1,550 feet downstream from McCarran Boulevard. Any direct or indirect adverse effects due to the construction of the weirs would be reduced to less than significant with BMP's.

The Huffaker Hills detention basin would be sited on stream, located on Steamboat Creek, approximately 5 river miles upstream from the Truckee River confluence at Mira Loma Road. The maximum storage capacity of the facility would be about 1,002 acre-feet. The structure is designed as earthen embankment with rock slope protection on the upstream and downstream surfaces. The embankment would only detain water during low frequency flood events on Steamboat Creek. The construction of the detention basin would require approximately 0.5 acre of Steamboat Creek to be converted into a culvert. The direct and indirect effects to water quality would be mitigated to less than significant and permanent losses to waters of the U.S. would be mitigated through habitat restoration measures in the project area, as discussed in section 5.5 Vegetation and Wildlife.

The detention basins would provide beneficial long-term direct and indirect effects to water quality with reduced peak flood flows, which would reduce the levels of turbidity and sedimentation due to erosion.

No adverse effects to ground water are anticipated due to construction activities. However, PCE and solvent contamination affect discrete areas of the downtown Reno corridor, certain areas in Sparks, and some outlying areas (Washoe County, 2007). Construction activities that would require dewatering would be required to test the groundwater for PCE contamination. The test results would be used to assess the need and type of proper treatment of contaminated water prior to discharge. No long-term effects on groundwater quality are expected to result from this alternative.

Lower Truckee River Reach

At the design flow event (1% chance of occurrence), this alternative would induce an additional 1,823 cfs of flow above existing conditions in the Truckee River downstream of Vista. While the 1 percent chance event flows with this alternative are approximately 300 cfs greater than induced flows generated by the Floodplain Terrace Plan , both short-term and long-term effects to water quality in the Lower Truckee River reach are expected to be the same for both alternatives. Short-term effects would be reduced to less than significant with implementation of appropriate BMP's as identified in Section 5.4.3 Mitigation Measures, below. Long-term effects to water quality would be less than significant as discussed for the Floodplain Terrace Plan , above.

5.4.3 Mitigation Measures

Alternative 3-Floodplain Terrace Plan and Alternative 2-Detention Plan

The measures proposed in this section are designed to avoid or minimize the short-term, temporary effects that would be associated with construction activities. Limiting in-channel construction activities to the summer low-flow period would minimize the potential for stormwater drainage erosion. For all construction activities, standard pollution prevention measures including (1) erosion and sediment control measures; (2) proper control of non-stormwater discharges; and, (3) hazardous spill prevention and response measures would be implemented as part of the project design specification and standard

construction practices. A water quality certification application would be submitted to NDEP following authorization of the project and prior to any construction activities.

Best Management Practices

BMPs are used to manage sediment and erosion during the construction of flood risk management projects. Construction period preparedness and weather condition BMPs control erosion and sediment through management and monitoring that includes: ensuring the contractor has the appropriate equipment and materials available at the start of construction to complete the project within the planned time frame; the contractor is prepared to dewater high groundwater areas for excavation; contingency BMP materials are available on-site for quick installation at exposed and/or affected areas; all disturbed areas are treated with erosion control measures, and coordination between vegetative planting and grading is in place prior to construction; excavation in wetland areas is scheduled to minimize groundwater effects on construction dewatering discharge; and daily weather monitoring for thunderstorms.

The contractors would prepare and implement an erosion control plan and a SWPPP to control erosion, storm water runoff, sedimentation, and other construction-related pollutants during all phases of construction, and until the construction is complete and all disturbed areas are permanently stabilized throughout the project area. The construction window for all in-river work would be between July 1 and September 30, when flows are at their lowest, for each construction year.

The short-term increase in sediment would be reduced to less-than-significant levels by implementing the following erosion control measures during construction:

- All soils would be stabilized within 14 days of completed work.
- Construction equipment would be limited to the actual area being disturbed and vehicles may not travel in areas to be left in their natural state.
- Short-term staging of soil material would be surrounded by a silt fence, fiber rolls, or other perimeter.
- Long-term staging of soil material (longer than one week) would be placed away from the stream, vegetated, and surrounded by a berm perimeter to control runoff and erosion.
- Existing vegetation would be left in place to the maximum extent possible.
- Bare ground would be watered to reduce wind and water erosion.
- Work in the water would be conducted during the low-flow period.
- Sediment barriers would be installed on graded or other disturbed slopes, as needed, to prevent sediment from leaving the project sites and entering nearby surface waters.
- The contractor would have a designated area for vehicle and equipment maintenance that is self-contained to protect groundwater, surface water, and soils from contamination.
- Dewatering water would be discharged into a meadow a sufficient distance from the stream to ensure no direct discharge back to the stream.
- Suitable stream crossings would be constructed and/or existing and appropriate access will be used to avoid damage to the streambanks and bed.
- Banks would be revegetated at the end of each construction season.
- Construction traffic would be restricted to predetermined routes.
- Traffic during wet weather or within the wet zone would be minimized and pivoting excavators

would be used.

Water Quality Monitoring

The contractor would be required to conduct water quality tests specifically for increases in turbidity and sedimentation caused by construction activities. Water samples for determining background levels would be collected in the Truckee River and its tributaries that are within the general vicinity of the construction sites. Testing to establish background levels would be performed at least once a day when construction activity is in progress. The contractor would monitor turbidity and settleable solids at least daily and turbidity at least hourly when a turbidity plume is visible. If turbidity limits are exceeded, the contractor would slow the rate of earthwork or use other means to comply with the requirements, including stopping construction activities until the plume has cleared.

Implement Bioengineering Techniques for Scour Protection

In order to minimize effects to water temperature as a result of scour protection features, to the extent possible bioengineering techniques would be incorporated into the scour protection features. This could include planting native vegetation cuttings (such as live willow stakes), sprouted seedlings, and vegetated coir (made from coconut fibers) matting, or other bioengineering approaches that would be explored further in the detailed design phase of the project. In addition, sedimentation and stability evaluations, in conjunction with development of construction-design-level hydraulic models following project authorization, would refine where and what type of scour protection would be required.

5.5 VEGETATION AND WILDLIFE

This section describes the existing vegetation and wildlife resources in the project area, discusses possible environmental consequences of project alternatives on these resources, and proposes avoidance, minimization, and mitigation measures to reduce the significance of project affects on vegetation and wildlife. The description of the resources is based on field visits, literature reviews, and coordination with USFWS and NDOW in accordance with the Fish and Wildlife Coordination Act. The Fish and Wildlife Coordination Act requires Federal agencies to coordinate with USFWS and State wildlife agencies during the planning of new or for modifications of existing water resources projects so that wildlife conservation receives equal consideration with other features of such projects throughout the decision making process. Wildlife resources are conserved by minimizing adverse effects, compensating for wildlife resources losses, and enhancing wildlife resource values. USFWS assessment of existing biological resources and recommendations on avoidance and minimization measures as well as wildlife enhancement opportunities are incorporated to the extent possible in this EIS. The final Coordination Act Report (CAR) prepared by USFWS that summarizes their assessment of alternatives and recommendations is included as Appendix B to this EIS.

5.5.1 Affected Environment

As described in the Nevada Wildlife Action Plan (NWAP), riparian systems in Nevada evolved in the presence of dynamic annual water cycles (NDOW, 2006). Riparian sites are typically adapted to spring flooding driven by snow melt, followed by a gradual decline in surface flows. In lowland riparian systems, the historic river channels themselves were dynamic, shifting with floods to abandon old channels and create new waterways, all the while leaving behind regenerating forests while older habitats gave way to scouring water. Dams to control floods and regulate the distribution of water have forever altered this natural process, while groundwater pumping has also affected surface flows in some areas.

Riparian areas have also been affected by concentrated grazing, cutting for timber and firewood,

residential development, river channelization, diversion, industrialization, log drives, wildfire suppression, trapping (principally beaver), exotic species (both plants and animals), unregulated recreation (both motorized and nonmotorized), road building, mining, pollution, farming, channel dredging, bank armoring, and construction of dams and levees.

However, invasive plants may be one of the greatest agents of change in these systems (NDOW, 2006). Saltcedar (*Tamarix spp.*) is an exotic riparian tree that has invaded all of Nevada's river systems to varying degrees. Another aggressive exotic invader present on Nevada's rivers is Russian olive (*Elaeagnus angustifolia*). These exotics have replaced the native midstory on many stretches of Nevada's rivers. Tall whitetop (*Lepidium latifolium*) is another noxious weed invading riparian areas in northern Nevada. The highly invasive nature of both saltcedar and tall whitetop gives them the ability to convert entire landscapes into undesirable monotypes.

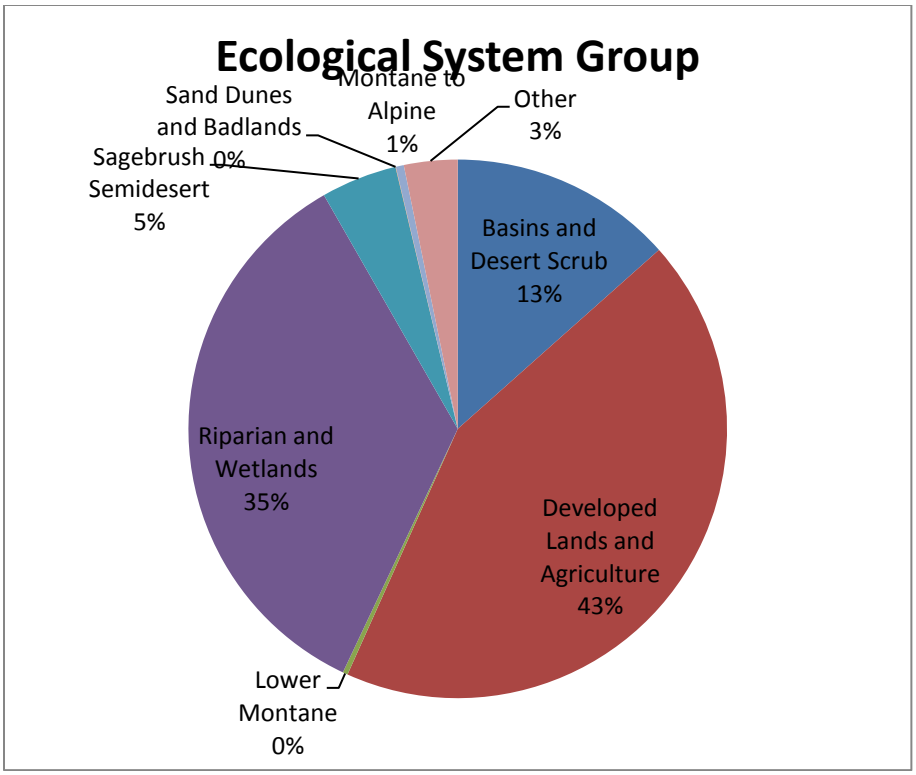
These sources of stress continue to exert pressure on riparian habitats, resulting in loss or modification of habitat integrity on the Truckee River and greatly influencing its current condition. The following discussion on existing biological resources reflects this stressed ecological condition while describing resources based on the geographic scope of the project area, which primarily consists of the Truckee River and the associated riparian zone. Where information indicates significant differences in the biological resources, these resources are described by reach. This section discusses terrestrial vegetation and associated wildlife encountered in the project area. Aquatic habitat is discussed in Section 5.7 Fisheries.

Terrestrial Vegetation

Historically, the Truckee River channel was once well connected to its floodplain, resulting in banks and riparian areas that supported abundant willow and cottonwood growth. The dominant riparian tree species existed as structurally complex, multi-canopy forests throughout much of the river corridor (Otis Bay, 2004). In the last century, riparian and upland vegetation has been severely altered as a result of human activities and natural disturbances including agricultural and urban development, timber harvest, fire, landslides, cattle grazing, industrial development, and human-made dams and diversions (Caicco, 1998). As a result, the overall quality of the riparian and shrub habitats has declined and undesirable weedy species have invaded a large portion of the floodplain (Otis Bay. 2004).

To further demonstrate the decline in riparian habitat, aerial photograph interpretation completed by Otis Bay Environmental Consulting indicates that between 1938 and 2000 the cottonwood-willow forest downstream of Vista to Pyramid Lake was reduced from 2,060 acres to 630 acres, representing a 70 percent decline in this important vegetation community type (Otis Bay, 2004). This has been detrimental to natural riverine ecosystem functions. However, in the last decade, some improvements have been observed as a result of the implementation of prescribed ecosystem flows, which have in turn benefited wildlife (Rood, Gourley, et al., 2003).

While much of the project area is associated with the Truckee River and its riparian zone, the majority of the area potentially affected by project alternatives would be considered upland habitat. In fact, based on the Nevada Natural Heritage Program's (NNHP) Nevada Vegetation Synthesis Map (SynthMap) (2008) approximately 45 percent of project features would be located in agricultural, developed, or barren land while almost 20 percent would be located in desert scrub or sagebrush habitat. Most of the remaining 35 percent would be in areas considered riparian habitat, including the Open Water cover type. Figure 5-4 shows the breakdown of Vegetation Cover Type encountered in the project area based on SynthMap coverage layers and NWAP's Ecological System Groups.



Note: Based on NNHP SynthMap GIS data (2008) and Nevada Division of Wildlife Wildlife Action Plan Ecological System Groups (2006).

Figure 5-4. Habitat Cover Types within the Project Area based on Nevada Wildlife Action Plan Ecological System Groups.

While Synthmap should not be used to compare in detail the extent of one vegetation type to another, it does, however, provide sufficient information to compare at a gross landscape perspective the predominant ecological systems in the project area (NNHP, 2008). Based on this assumption, the predominant ecological systems encountered in the project area are listed in Table 5-5 below.

The Riparian and Wetlands ecological systems are discussed in more detail under the Riparian and Wetlands Vegetation section below. Ecological systems in the Basins and Desert Scrub, Sagebrush Semi-desert, Developed Lands and Agriculture, and Other groups are included in the Upland Vegetation discussions that follow. The Open Water or Aquatic Vegetation ecological system is covered in Section 5.7. Fisheries.

Riparian and Wetlands Vegetation

Under current conditions, the key habitats within the project area transition from montane forest to shrubland as the river flows down from the Sierra Nevada Mountains and reaches the western edge of Reno. This broad transition zone marks a shift in flora between the Mediterranean climate of California and the interior continental climate of the Great Basin (Manley et al., 2000). The obvious shift from forest to shrubland is paralleled by a more subtle change in the structure and composition of riparian vegetation along the Truckee River. The montane riparian forest typified by black cottonwood (*Populus trichocarpa*) and pine (predominantly ponderosa pine (*Pinus ponderosa*)) with an alder-willow understory merges gradually to the Great Basin riparian forest of Fremont's cottonwood (*Populus fremontii*) and willow shrub (*Salix* spp.), or stands of shrubby willow lacking trees (Caicco, 1998).

Table 5-5. Predominant Ecological Systems in the Study Area.

Ecological System Group	Ecological Systems	Acres
Riparian and Wetlands	Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland	379
	Intermountain Basins Montane Riparian Systems	527
	Open Water or Aquatic Vegetation	206
	Introduced Riparian Vegetation	70
Basins and Desert Scrub	Intermountain Basins Greasewood Flat	79
	Intermountain Basins Mixed Salt Desert Scrub	398
Sagebrush Semi-desert	Intermountain Basins Big Sagebrush Shrubland	139
	Intermountain Basins Semi-Desert Grassland	11
	Intermountain Conifer Forests and Woodland	6
Developed Lands and Agriculture	Agriculture	711
	Developed	825
Other	Introduced Upland Vegetation	113

Based on the NWAP, the Riparian and Wetlands Ecological System Group for the project area's ecological systems (Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland; Intermountain Basins Montane Riparian Systems) is most closely associated with the Intermountain Rivers and Streams key habitat (NDOW, 2006). In this key habitat, riparian areas are most often associated with streams, lakes, springs, and wetlands, but may also occur on upland sites if conditions influenced by topography, elevation, and precipitation produce sufficient soil moisture to support the vegetation types.

In montane riparian systems such as what are encountered in the upper segments of the Verdi Reach, the vegetation generally follows the saturation zone of a stream course, spring outflow, or catchment basin. Dominant tree and shrub species in these systems may include cottonwood (*Populus* spp.), aspen (*Populus tremuloides*), alder (*Alnus* spp.), birch (*Betula occidentalis*), willow (*Salix* spp.), wild rose (*Rosa* spp.), and red-osier dogwood (*Cornus sericea*). Mature plant heights can range from less than 80 inches to 120 feet. Left undisturbed, deciduous riparian habitats attain a complex, multi-layered vertical structure with an intermittent to continuous overstory, a midstory that is often dense and impenetrable, and an understory rich in grasses and forbs.

Lowland riparian habitats are those associated with the floodplains of the Truckee River through the majority of the project area except for the uppermost segments of the Verdi reach. Lush habitat conditions supported by these lowland floodplains stand in stark contrast to the arid landscapes through which they course. Lowland riparian habitats are typically dominated by Fremont cottonwood. Several species of willow are found on river floodplains, including sandbar (*Salix sessilifolia*), arroyo (*Salix lasiolepis*), red (*Salix laevigata*), Goodding's (*Salix gooddingii*) and shining (*Salix lucida*) willow. Buffaloberry (*Shepherdia* spp.) is present to varying degrees in all of the northern Nevada river systems. Many of these lowland systems have been invaded by saltcedar (*Tamarix ramosissima*) and Russian olive (*Elaeagnus angustifolia*).

Meadows of grasses, sedges, and rushes occur on shorter, more disjunct stretches of the Truckee River floodplains. Creeping wildrye (*Leymus triticoides*) is one of the most important meadow grasses. Other plants that may occur within lowland floodplains include saltgrass (*Distichlis spicata*), greasewood (*Sarcobatus vermiculatus*), and sagebrush (*Artemisia* spp.).

Floodplains of intermountain riparian systems may only reach widths up to a few hundred yards in the restricted canyons of the Truckee River. Riparian vegetation is distributed according to different plant species' affinity for water and the extent to which river flow is distributed across its floodplain. Mature plant heights can range from less than 80 inches for greasewood to 100 feet tall for Fremont cottonwood. Left to their own natural disturbance regimes, habitat structure in lowland riparian areas is substantively similar, though typically wider in extent than montane riparian systems. One expression of cottonwood overstory is called gallery forest, where the canopy closes and effectively shades out the midstory, creating a tall, high-canopy forest that can stretch across the floodplain for hundreds of yards.

In general, three types of riparian vegetation occur within the project area: transmontane freshwater marsh, palustrine scrub-shrub, and palustrine forested.

Transmontane Freshwater Marsh

Transmontane freshwater marsh includes areas typically dominated by dense perennial, emergent vegetation. Common plant species include slender-beak sedge (*Carex athrostachya*), water sedge (*Carex aquatilis*), and beaked sedge (*Carex rostrata*). The restricted distribution of emergent vegetation and the prevalence of plant species that require a high water table indicate the habitat cannot tolerate extended periods of drought.

Transmontane freshwater marsh habit is restricted to small areas and narrow bands of streambank vegetation downstream from Verdi and to a few low-lying areas away from the active stream channel where it may persist due to irrigation runoff or seasonal ponding. Based on USFWS mapping (1995a), 31 acres occurred downstream from Sparks in the early 1990's, primarily upstream of the Tracy hydroelectric plant and Derby diversion dam. Other larger examples are found downstream from Dead Ox Wash. Current vegetation maps indicate sporadic occurrences along the river margins through the Lower Truckee River reach (USACE, 2005). Common plant species include cattail (*Typha* L.), hardstem bulrush (*Schoenoplectus acutus*), Olney's bulrush (*Scirpus americanus)*, common reed (*Phragmites australis*), slender-beak sedge, soft rush (*Juncus effuses*), least spikerush (*Eleocharis acicularis*), and aquatic species, such as common waterweed (*Elodea sp.*) and pondweed. The introduced noxious weed, tall whitetop, is also common in these wetlands. Streamflows of 400 to 600 cfs are usually sufficient to inundate the areas where it is found, and inundation occurs annually (USFWS 1993).

Palustrine Scrub-shrub

Palustrine scrub-shrub habitat is dominated by shrubs or young trees less than 20 feet tall (Cowardin et al., 1979). The most common type is the Modoc-Great Basin riparian scrub (*Salix exigua*) which is a generally dense, deciduous thicket found downstream from Verdi along riverbanks, irrigation ditches, and on stable gravel bars (Caicco, 1998; USFWS, 1993). Where willows are dominant, coyote willow (*Salix exigua)* is the most abundant, although yellow (*Salix lutea*) and shining (*Salix lucida*) willows are also common. Downstream from Sparks, riparian scrub habitat is often dominated by Fremont cottonwood (*Populus fremontii*) saplings. Whether dominated by willow or cottonwood, younger stands often have dense herbaceous understories; older, denser shrub stands usually lack an herbaceous understory. The most common herbaceous species are white sweet-clover (*Melilotus albus*), white clover (*Trifolium repens*), tall whitetop, and slender-beak sedge. All but the latter are introduced species.

Many lower terraces and toe slopes adjacent to the river channel and on gravel bars within the active channel along the lower Truckee River are dominated by cottonwood saplings. Scour during high flows in 1986 and 1997 produced mineral surfaces that enabled abundant cottonwood seed germination in subsequent springs. Flows provided for cui-ui spawning had the added benefit of enabling the establishment of the seedlings (Rood et al., 2003). When USFWS mapped and collected field data in the early 1990s, most cottonwoods that resulted from the 1986 flood were less than 10 feet high. Such young

cottonwoods are initially susceptible to loss during subsequent high flow but become less so after they have become established. Some unknown proportion of these cottonwood saplings are now 20-30 feet high (Rood et al., 2003). Although these habitats now exceed the 20-foot threshold that distinguishes palustrine scrub-shrub from palustrine forest, their dense, thicket-like structure is distinctly different from more mature cottonwood forests.

Willow-dominated communities appear to be restricted to areas inundated annually, while lower terraces dominated by cottonwood saplings are inundated approximately once every 1 to 5 years; corresponding streamflows are 100 to 6,900 cfs between Reno and Nixon (USFWS, 1993). Occasional scouring flows (greater than 10,000 cfs) are important to remove decadent vegetation and maintain the vigor and diversity of this habitat. Such flows occur about once every 10 years (USFWS, 1993).

Palustrine Forested

Palustrine forested habitats are dominated by woody vegetation at least 20 feet tall (Cowardin et al., 1979). Within the lower elevations along the Truckee River, the most common of this wetland type is the Modoc-Great Basin cottonwood-willow riparian forest (Caicco, 1998). Fremont cottonwood is the sole dominant tree species in this deciduous forest. Coyote willow is present in the understory in some areas. More commonly, upland shrubs, including big sagebrush (*Artemisia tridentata*) and rabbitbrush, are understory dominants. The prevalence of upland shrubs likely reflects a lowered groundwater table. There is little herbaceous understory, but extensive patches of tall whitetop are common. Typical examples occur sporadically downstream from Sparks. Mature cottonwood trees, estimated to be up to 140 years old, are scattered infrequently on upper terraces now less subject to inundation (USFWS 1993).

Additional vegetation types associated with surface water are present. Gravel bars occur primarily on the inner bends of the river. Many are under water during higher flows, but as streamflows decline in the summer and fall months, they are colonized by a diverse variety of plant species. Over successive years, this can result in healthy mixed willows. Plant cover is generally low (less than 30 percent), but more bars may become vegetated when streamflows remain low over longer periods of time, as during drought. Common herbaceous species are slender-beak sedge (*Carex athrostachya*), common monkey-flower (*Mimulus guttatus*), and hairy willow-herb (*Epilobium hirsutum*). Saltcedar is found lower down in the Truckee River and is associated with streambanks.

Waters of the United States

In order to identify waters of the U. S. at a planning level, a delineation of aquatic resources was performed within the project area between June and September 2005 (Lichvar and Ericsson 2005). A planning level delineation is defined here as the identification of areas that meet the jurisdictional requirements under CWA Section 404 at a watershed scale. Although the delineation is highly accurate at the planning level, it is not specific to any one site. Thus, a planning-level wetland delineation does not replace the need for a jurisdictional wetland delineation. However, the level of accuracy is sufficient to carry out a landscape level analysis of effects to waters of the U. S. following the USEPA 404(b)(1) Guidelines. Because the proposed project would be constructed in phases due to its size and geographical extent, a field delineation of jurisdictional waters within each phase would be carried out prior to construction to refine the 404(b)(1) analysis completed for this EIS. The 404(b)(1) analysis is included in Appendix C of this EIS.

The modification of standard delineation sampling protocols and the development of wetland ratings for Section 404 Regulatory purpose for the riparian vegetation map units allowed for a watershed scale delineation. The sampling protocols outlined in the USACE Wetlands Delineation Manual

(Environmental Laboratory 1987)[7] were modified for use at the watershed scale. To delineate at this scale, fluvial geomorphic surfaces were mapped in the riparian zones representing several different flood return intervals, which were later interpreted for frequency requirements under Section 404, as represented in Figure 5-5. Individual vegetation units were sampled to develop a characterization of the indicators for both wetlands and other waters of the United States. Wetland decisions were determined by combining the field data for wetland criteria for each separate vegetation map unit with the distribution patterns of vegetation units within the geomorphic surfaces. By combining the wetland indicators with flood frequency information obtained from the geomorphic surface map, jurisdictional decisions were made regarding waters of the United States, including wetlands across the entire study area.

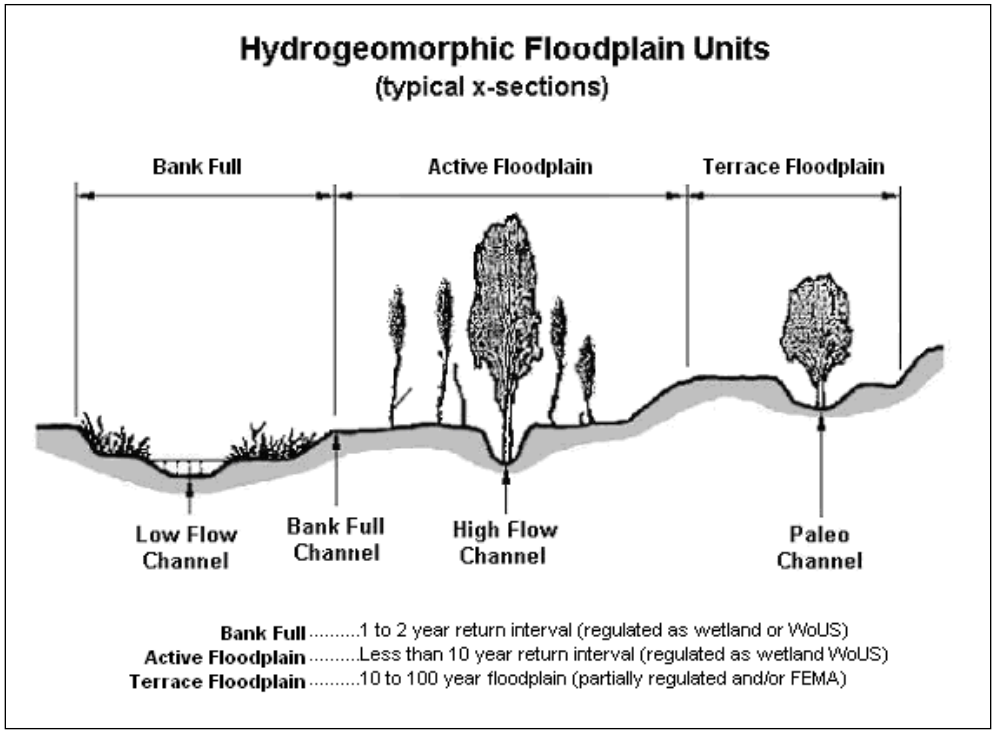


Figure 5-5. Hydrogeomorphic Floodplain Units.

The vegetation units in the riparian areas were then rated for their probability of meeting the criteria as either wetland or non-wetland waters of the United States. These ratings resolved the issue that some vegetation units had repeatable characteristics that always meet the criteria of a Water of the United States, including wetlands, and others were so ecologically diverse that they were able to occur in various landscape positions. By combining field sampling and observations with distribution patterns analyzed within the GIS database, probabilities ratings intended for regulatory purposes were developed to accommodate all variations. As shown in Table 5-6, six categories of wetland ratings were assigned to each of the riparian vegetation units with ratings ranging from always regulated to upland or not regulated.

[7] Lichvar was also assisting in the development of the 2008 Arid West and 2010 Western Mountains, Valleys, and Coast Supplements to the 1987 Manual at the time of his watershed scale delineation of the Truckee River. The sampling protocols followed for the delineations were in line with the later supplements (Lichvar pers. Comm.,2012).

Table 5-6. Regulatory probability ratings assigned to riparian vegetation types

Rating	Description
1	Types meet the criteria for a wetland or WoUS 100% of the time
2	Types meet the criteria for a wetland or WoUS 67-98% of the time
3	Types meet the criteria for a wetland or WoUS 33-66% of the time.
4	Types meet the criteria for a wetland or WoUS 2-32% of the time (primarily uplands)
5	Types meet the criteria for a wetland or WoUS <2% of the time (primarily uplands)
6	Unregulated upland
Source: Lichvar, Robert and Michael Ericsson. 2005. *Delineation of Aquatic Resources Using Vegetation Communities and Fluvial Surfaces Within Selected Reaches of the Truckee River, Washoe and Storey Counties, Nevada.*	

Upland Vegetation

Much of the undisturbed upland habitat encountered would be considered either Intermountain cold desert scrub (Intermountain Basins Greasewood Flat; Intermountain Basins Mixed Salt Desert Scrub) or Sagebrush (Intermountain Basins Big Sagebrush Shrubland; Intermountain Basins Semi-Desert Grassland), although significant segments are developed landscapes and agricultural lands (NDOW, 2006). Many of the upland plants that occur are drought tolerant due to the dry climatic conditions. In addition, many plants are tolerant of alkaline and saline soil conditions. Plants with higher moisture requirements are generally found in soils adjacent to the river channel or soils with a higher ground water table. Typical upland plants that are tolerant of semi-arid, saline, and alkaline soils include greasewood (*Sarcobatus vermiculatus*), sagebrush (*Artemisia spp.)*, bitterbrush (*Purshia tridentata*), ephedra (*Ephedra viridis* Coville), rabbitbrush (*Chrysothamnus* Nutt.), four-wing saltbush (*Atriplex canescens*), shadscale (*Atriplex confertifolia*), and various native grasses (Otis Bay, 2004).

Upstream of Wadsworth, sagebrush communities are predominant. They are dominated by big sagebrush (*Artemisia tridentata*) with an understory dominated by the exotic annual grass, cheatgrass (*Bromus tectorum*). Desert scrub communities are generally found on the more xeric sites downstream of Wadsworth and are dominated by shadscale, four-wing saltbush, and black greasewood (*Sarcobatus vermiculatus*), although big sagebrush also occurs. Cheatgrass (*Bromus tectorum*) is a dominant understory herbaceous plant in these areas, as well. Other herbaceous plants that are common here are tansy mustard (*Descurainia pinnata*), Rocky Mountain bee plant (*Cleome serrulata*), and Russian thistle (*Salsola kali*).

Extensive areas along Steamboat Creek and downstream from the Reno/Sparks metropolitan area are dominated by the noxious weed tall whitetop (Caicco, 1998). It is a Federally listed noxious weed that forms large monoculture colonies that dominate fields and wetlands. It is very persistent and is an extremely effective competitor of desired native vegetation. Research indicated that it did not occur in the Truckee River in 1971, but by 1992, occupied about 12,000 acres along the lower Truckee River (Donaldson & Johnson, 1999). Tall whitetop seeds and roots from eroded banks and may travel long distances in rivers and irrigation ditches to invade new areas. During construction and landscaping projects tall whitetop may spread though contaminated soils. They may be transported to other areas via mobile equipment or livestock. It can also invade areas where contaminated straw is used for erosion-control projects. Tall whitetop control in newly planted areas in the Truckee River will be imperative.

Other problematic weedy species include musk thistle (*Carduus nutans*), common ragweed (*Ambrosia artemisifolia*), Canada thistle (*Cirseum arvense*), bull thistle (*Cirseum vulgare*), poison hemlock (*Conium maculatum*), prickly lettuce (*Lactuca serriola*), low whitetop (*Cardaria draba*), purple loosestrife (*Lythrum salicaria*), Russian thistle (*Salsola tragus*), Russian knapweed (*Centaurea repens*), yellow starthistle (*Centaurea solstitialis*), cocklebur (*Xanthium strumarium*), and tamarisk (*Tamarix ramosissima*) (Otis Bay, 2004).

Wildlife

The riparian and upland ecological systems described above provide habitat for a wide range of wildlife species. Some species are obligates to particular vegetation communities while others use these communities as support habitat for foraging, breeding, and shelter. This section discusses the common wildlife associated with the various ecological systems present in the project area. While there is reference made to some species of conservation priority, the discussion of special-status species is carried out in detail in section 5.8 Special-status Species. Aquatic species are discussed in section 5.7 Fisheries.

Although small in extent, riparian communities in this region are critical centers of wildlife diversity (Mac, 1988). More than 75 percent of the species in Nevada are strongly associated with riparian vegetation, including 80 percent of the birds (U.S. General Accounting Office, 1993; Dobkin, 1998). Rivers and streams provide surface water for wildlife. Because of the presence of water either at or near the surface, riparian systems are the most productive habitats in the ecoregion. This includes production of seeds, fruits, insects, arthropods, reptiles, amphibians, fish, and vegetation for wildlife food, and often abundant vegetative growth that provides nest and den sites, cavity sites, hiding cover, and thermal cover. Riparian trees and shrubs have well developed root systems that contribute to bank stability, slowing or eliminating erosion. Riparian areas provide corridors for either long distance migration (birds, bats) or short-distance wildlife movements (deer, bobcat). By facilitating such movements, riparian corridors connect and improve the genetic health of wildlife populations. Finally, wetted backwaters along streams that receive water during high flows in the spring provide excellent habitat for frogs.

For upland habitat, the Intermountain Cold Desert Scrub is the most important habitat in Nevada for several species of conservation priority, including kit fox (*Vulpes macrotis*), pale kangaroo mouse (*Microdipodops pallidus*), and loggerhead shrike (*Lanius ludovicianus*) (NDOW, 2006). Soils of this habitat tend to be loose and either sandy or gravelly and are easily excavated by denning or burrowing animals. It is an important feeding habitat for pallid bats (*Antrozous pallidus*) and serves as breeding habitat or support habitat for several bird species such as loggerhead shrike, sage thrasher (*Oreoscoptes montanus*), sage sparrow (*Amphispiza belli*), Brewer's sparrow (*Spizella breweri breweri*), and black-throated sparrow (*Amphispiza bilineata*). Bald eagles (*Haliaeetus leucocephalus*) winter in the valley bottoms, preying on jack rabbits (*Lepus* spp.), while kit fox and prairie falcons (*Falco mexicanus*) feed primarily on rodents in the ground squirrel-cottontail size class. Washes are prominent features within the Intermountain Cold Desert Scrub habitat type, and can serve as enhanced movement and migration pathways for many species and facilitate their distribution across the landscape (NDOW, 2006).

In Nevada, eight species of conservation priority are predominantly dependent on Sagebrush habitat for most of their life history needs including pygmy rabbit, Great Basin pocket mouse, sagebrush vole, sagebrush lizard, greater sage-grouse, sage thrasher, Brewer's sparrow, and sage sparrow (NDOW, 2006). Mule deer are also dependent on the sagebrush type to meet some of its life history requirements.

5.5.2 Environmental Consequences

This section evaluates the effects of the proposed alternatives on vegetation and wildlife resources in the project area. Effects of the proposed alternatives were analyzed during coordination with the USFWS under the Fish and Wildlife Coordination Act.

Methodology

The evaluation methodology is based on a comparison of existing to future conditions in terms of surface area (acres) and consideration of the value of habitat cover types to wildlife and fish. Existing

cover types are delineated based on vegetative and water surface mapping units identified by Lichvar and Ericsson (USACE, 2005). Using the vegetation/surface water map units identified in USACE' wetland delineation study carried out by Lichvar and Ericsson and appended with vegetation cover mapping carried out in 2008 as part of USACE' Bank, Bed, and Pier Scour analysis, seven major surface cover types were identified within the footprint of the project area.

Table 5-7 shows the major cover types and evaluation species chosen for each major cover type. The resource category based on the mitigation policy of the USFWS is also indicated in the table. In general, wetlands/marshes, waterbodies, and their closely associated native vegetation community types were assigned to the highest-valued category found in the system (i.e., Resource Category 2). This is supported by the contention that riparian areas in close proximity to surface water often support greater wildlife diversity and biomass. Also these areas serve as highly functional corridors that enhance connectivity and preserve biodiversity at the landscape scale (Damschen, Haddad, et al., 2006).

Utilizing outputs from the Habitat Evaluation Procedure and Aquatic Habitat Evaluation for the Truckee Meadows and Lower Truckee River Restoration Reaches (USACE 2007), habitat values, in the form of Average Annual Habitat Units (AAHUs), were estimated for changes in habitat as a result of project features from each alternative in the Truckee Meadows reach. The habitat evaluation procedure (HEP) used the evaluation species identified in Table 5-7 to generate habitat suitability index values for existing habitat cover types affected. Using these values and the acres of habitat change, the amount of habitat value changed, in the form of AAHUs, was quantified. HEP assumptions and outputs are included in Appendix D.

Lichvar and Ericsson's planning level delineations (2005) were used to identify jurisdictional waters affected. These results are summarized in the discussion of effects for each alternative below. The 404(b)(1) analysis carried out for this study is included in Appendix C.

In recommending mitigation for adverse effects to vegetation and wildlife, sequential mitigation steps recommended in the President's Council on Environmental Quality in the NEPA regulations (40 CFR Part 1508.20 [a-e]) are followed. These mitigation steps (in order of preference) are: a) avoidance of effect; b) minimization of effect; 3) rectification of effect; 4) reducing or eliminating the effect over time; and e) compensating for the effect.

Significance Criteria

Adverse effects on vegetation and wildlife were considered significant if implementation of an alternative plan would result in any of the following:

- Result in a substantial loss of native vegetation.
- Substantially reduce the quality and quantity of important habitat or access to such habitat for wildlife species.
- Remove, fill, or substantially disturb a jurisdictional wetland or other jurisdictional Water of the United States.

Table 5-7. Major Surface Cover Type, Evaluation Species, and Assigned Resource Category.

Lichvar Vegetation Map Unit	Major Cover Type	Evaluation Species	Resource Category
Freshwater Marsh__*Juncus* spp. Freshwater Marsh__*Scirpus acutus* Freshwater Marsh__*Scirpus americanus* Freshwater Marsh__*Typha* spp. Herbaceous, Native__Riparian Dry (Dry Species) Herbaceous, Native__Riparian Moist (Moist Species) Herbaceous, Native__Riparian Wet (Wet Species)	Emergent Wetland/Marsh (EWM)	Mink, marsh wren	2
Water Body__Freshwater Pond Water Body__River Water Body__Stream	Open Water / Pond / Riverine (OWPR)	Mink, marsh wren	2
Trees/Woodland/Forest, Native__*Acer macrophyllum* Trees/Woodland/Forest, Native__*Alnus rhombifolia* Trees/Woodland/Forest, Native__*Populus balsamifera* Trees/Woodland/Forest, Native__*Populus fremontii* Trees/Woodland/Forest, Native__*Salix exigua* Trees/Woodland/Forest, Native__*Salix goodingii* Trees/Woodland/Forest, Native__*Salix lasiolepis*	Native Riparian Forest (NRF)	Northern oriole, hairy woodpecker, spotted towhee	2
Grassland, Native__*Achnatherum hymenoides* Grassland, Native__*Elymus* spp. Shrub, Native__*Alnus* spp. Shrub, Native__*Artemisia tridentata* Shrub, Native__*Atriplex canescens* Shrub, Native__*Chrysothamnus* spp. Shrub, Native__*Gutierrezia sarothrae* Shrub, Native__*Populus fremontii* Shrub, Native__*Sarcobatus vermiculatus*	Upland Native Herbaceous / Shrub / Grasslands (UNHSG)	Yellow warbler, American kestrel	3
Shrub, Native__*Salix exigua* Shrub, Native__*Salix lasiolepis*	Willow / Mixed Willow Scrub (WMWS)	Yellow warbler, spotted towhee, American kestrel	3

Lichvar Vegetation Map Unit	**Major Cover Type**	**Evaluation Species**	**Resource Category**
Man Made Structures__Agricultural Field Man Made Structures__Business Man Made Structures__Disturbed Sites Man Made Structures__Flood Control Structure Man Made Structures__Golf Course Man Made Structures__Park Man Made Structures__RV Park Man Made Structures__Residential Man Made Structures__School Unvegetated__River Bed Unvegetated__Rock	Disturbed/Bare (DB)	American kestrel	4
Herbaceous, Non-Native__*Cardaria pubesces* Herbaceous, Non-Native__Common Weeds Herbaceous, Non-Native__*Kochia* spp. Herbaceous, Non-Native__*Lepidium* spp. Grassland, Non-Native__*Eragrostis cilianensis* Grassland, Non-Native__*Lolium perenne* Shrub, Non-Native__*Prunus cerasifera* Shrub, Non-Native__*Salsola tragus* Shrub, Non-Native__*Tamarix* spp. Trees/Woodland/Forest, Non-Native__*Ulmus* spp. Trees/Woodland/Forest, Non-Native__*Ailanthus altissima* Trees/Woodland/Forest, Non-Native__*Salix babylonica*	Upland Non-native Herbaceous (UNNH)	Yellow warbler, American kestrel	4

General Effects Considerations

Below are preliminary concerns that USFWS has identified for consideration when evaluating effects to habitat:

- permanent displacement of highly valued riparian habitat types, including existing cottonwood and willow stands;
- loss of complex river geometry (e.g., gravel bars, riffles) in favor of flow conveyance;
- entrainment or stranding of fish by structural features immediately after flood events;
- loss of desireable channel features (e.g., large woody debris, gravel and cobble substrates);
- degraded water quality associated with in-channel construction activities like dredging;
- direct disturbance to fish and wildlife from construction activities;
- spread of invasive species (e.g., tall whitetop) from construction activities;
- extensive use of riprap and other "hardened" features over bio-engineering techniques;
- construction-related disturbance during sensitive periods (e.g., nesting season);
- disturbance from temporary roads and staging areas;
- improper storage of excess spoil material;
- contamination from spill and an inadequate countermeasure plan;
- creation of habitats favoring non-native species; and
- flow of contaminants from stormwater runoff.
- mobilization of contaminants (e.g., mercury, arsenic, and boron) from Steamboat Creek and hazardous materials from other areas;
- lack of long-term management plans for highly valued habitat areas;
- high failure rate of new plantings

No Action Alternative

The current incised condition of the river channel would continue to evolve until equilibrium is reached, but at a much slower pace due to the current hydrologic regime and existing streambed armoring and grade control structures (dams, bridges, weirs, rock formations). Reestablishment of floodplains and associated riparian habitat would, therefore, progress at a slower pace in the future and would only be within the degraded or enlarged channel (smaller than historic floodplains). Restoration efforts from TNC and others would accelerate the channel evolution, dependent upon funding and land availability.

Implementation of TROA is expected to enhance riparian habitat and riparian-associated wildlife species because of the increased availability of environmental flows when compared to pre-TROA conditions.

Alternative 3-Floodplain Terrace Plan

<u>Truckee Meadows Reach</u>

Direct and indirect effects to habitat cover types in the Truckee Meadows reach from the Floodplain Terrace Plan are discussed below. The acreage of habitat types affected is shown by feature in Table 5-8.

Upland Non-Native and Disturbed/Bare Habitat. Of the approximately 202 acres of habitat disturbed by project features in this alternative, approximately 165 acres would be either on existing non-native upland habitat or disturbed/bare habitat. The majority of the remaining 37 acres occur in mixed willow or native riparian forest habitat.

Mixed Willow Scrub. Within the Trucke Meadows reach, the existing mixed willow habitat is located primarily along the river margins and along the drainage and irrigation ditches, such as Pioneer Ditch and the North Truckee Drain. As indicated in Table 5-8, project features would disturb approximately 18.3 acres of this habitat. Levee and floodwall construction would permanently remove about 4.8 acres of mixed willow habitat. In addition, placing the North Truckee Drain in culverts, and installing recreation features would result in the loss of approximately 1.7 acres of mixed willow habitat.

The scour protection features would affect approximately 3.7 acres; however, the bridge and bank scour protection design is expected to leave existing native vegetation in place to the extent possible, by placing rock around the vegetation. The scour protection designs also call for placement of willow pole cuttings in the spaces between rocks to aid in the reestablishment of vegetation post-construction.

Table 5-8. Effects to Existing Habitat Cover Types in the Truckee Meadows Reach – Alternative 3-Floodplain Terrace Plan .

Flood Risk Management Features	Habitat Cover Types Affected - Acres						
	Emergent Wetland/ Marsh (EWM)	**Upland Native Herbaceous / Shrub / Grasslands (UNHSG)**	**Upland Non-native Herbaceous (UNNH)**	**Disturbed/ Bare (DB)**	**Native Riparian Forest (NRF)**	**Willow/ Mixed Willow Scrub (WMWS)**	**Open Water / Pond / Riverine (OWPR)**
Bank Scour Protection - Riprap	0	0.6	3.5	1.7	0.8	2.8	1.9
Bank Scour Protection - Bioengineered	0	0	1.9	0.2	0	0.4	0.8
Bridge Scour Protection	0	0	0.1	0.4	0.1	0.5	1.0
In Channel Floodwall	0	0.2	0.9	3.5	0.6	1.3	0
Levee	0.8	0.4	17.4	49.4	2.9	3.5	0.3
North Truckee Drain	0	0	0.2	0.1	0	0.7	1.5
On-Bank Floodwall	0	0	1.4	3.3	0.8	0	0
Floodplain Terrace	0.3	0.5	7.8	43.8	4.8	8.1	0.7
Recreation footprint	0	0	2.2	23.0	0	0.8	0
Total	**1.1**	**1.7**	**35.4**	**125.4**	**10**	**18.1**	**6.2**

Floodplain terraces would be excavated on the south bank between Greg Street and E. McCarran Boulevard. While most of the terracing would take place on existing agricultural land or bare/disturbed habitat cover types, there are patches of existing mixed willow scrub present within the terracing

footprint. To the extent possible, this native habitat would be integrated into the terracing designs. However, approximately 8.1 acres of mixed willow scrub is currently assumed to require removal. As part of the environmentally sustainable design proposed for this project, approximately 47.4 acres of willow/mixed willow scrub habitat establishment is proposed on the new terraces along with native riparian forest habitat. This would result in a net increase of 29.1 acres of mixed willow habitat within the Truckee Meadows reach following project construction. Reasonable effort will be made during detailed design and construction to further avoid and minimize the loss of existing habitat to the extent that project performance requirements will allow. This alternative would have a short-term adverse effect on willow scrub habitat with long-term beneficial effects to this habitat as a result of revegetation in the floodplain terraces. Overall, this alternative would have a less-than-significant effect on willow scrub habitat in the Truckee Meadows reach.

Native Riparian Forest. Native riparian forest habitat in the Truckee Meadows reach is primarily dominated by Fremont cottonwoods. This habitat also tends to be associated with the river margin and irrigation and drainage ditches, although typically further removed from the water bodies than the mixed willow habitat. Proposed flood risk management and recreation features have the potential to remove up to 10 acres of native riparian forest habitat, mostly in conjunction with floodplain terrace excavation and construction of levees and floodwalls. Similar to avoidance and minimization efforts discussed for the mixed willow scrub habitat above, design and construction of scour protection and floodplain terrace features will seek to integrate existing native riparian forest habitat into its design to the extent practicable. In addition, establishment of approximately 12.1 acres of riparian forest habitat is proposed on the floodplain terraces as part of environmentally sustainable design efforts for this project. This would result in a net increase of 2.1 acres of riparian forest habitat following project construction. Reasonable effort will be made during detailed design and construction to further avoid and minimize the loss of existing habitat to the extent that project performance requirements will allow. This alternative would have a short-term adverse effect on native riparian forest habitat with long-term beneficial effects to this habitat as a result of revegetation in the floodplain terraces. Overall, this alternative would have a less-than-significant effect on native riparian forest habitat in the Truckee Meadows reach.

Emergent Wetland/ Marsh. Of the vegetation cover types selected to represent the emergent wetland/marsh habitat, the Herbaceous, Native_Riparian Moist cover type is the only type encountered within the footprint of this alternative's features in the Truckee Meadows reach. Specifically, this cover type is associated with agricultural fields that have been fallow for a period of years and present native herbaceous vegetation in moist areas of the field. Review of recent aerial imagery indicates that these fields have been plowed again for agricultural purposes; therefore, the value of the 1.1 acres of Herbaceous, Native_Riparian Moist habitat lost due to project construction would be low. Effects to emergent wetland/marsh habitat in the Truckee Meadows reach would be less-than-significant.

Open Water/Pond Riverine. Other than approximately 0.3-acre of a settling basin at the Glendale Water Treatment Facility that may be filled to construct levee features, the majority of the 6.2 acres of open water/pond/riverine habitat affected by this alternative is attributed to the Truckee River's riverine habitat and the stream habitat associated with the North Truckee Drain. Proposed scour protection features along the river, including bioengineered features, would affect 3.7 acres of riverine habitat; however, these measures would not result in a permanent loss of open water habitat, but could, without proper environmentally sustainable design and implementation, cause a reduction in the quality of the effected habitat. Placement of the North Truckee Drain into culverts would further reduce the value of 1.5 acres of low quality stream habitat present in this drain. While the current alignment of the floodplain terrace footprint indicates an effect to approximately 0.7-acre of riverine habitat, it is expected that detailed design and construction of the terraces would avoid this loss, and, with the implementation of the proposed revegetation measures, could present an overall benefit to the quality of riverine habitat along approximately 1.7 miles of the river. With implementation of environmentally sustainable design

features, particularly in the floodplain terraces, effects to this habitat cover type would be less-than-significant as a result of this alternative.

Waters of the United States. Based on the planning level delineation of aquatic resources (Lichvar and Ericsson 2005), the flood risk management and recreation features of the Floodplain Terrace Plan in the Truckee Meadows reach would disturb or place fill in approximately 28.6 acres of waters of the U.S., as shown in Table 5-9. Proposed fishing (220 square feet of rock/gravel per site) and kayak access (500 square feet of rock/gravel per site) recreation features represent approximately 0.1 acre of that disturbance. The acres of waters of the United States affected are a subset of the total acres of habitat cover types affected as shown in Table 5-8.

Table 5-9. Placement of Fill in Waters of the United States, Alternative 3-Floodplain Terrace Plan, Truckee Meadows Reach.

Feature	Acres
Bank Scour Protection - Riprap	5.4
Bank Scour Protection - Bioengineered	1.2
Bridge Scour Protection	1.7
On bank Floodwall	0.1
In channel Floodwall	1.7
Levees	6.5
Floodplain Terrace	10.2
North Truckee Drain	1.7
Recreation	0.1
Total	**28.6**

Note: Acreages based on delineations from Lichvar, Robert and Michael Ericsson. 2005. *Delineation of Aquatic Resources Using Vegetation Communities and Fluvial Surfaces Within Selected Reaches of the Truckee River, Washoe and Storey Counties, Nevada.*

As shown in Table 5-10, the vast majority of effects to waters of the United States are attributed to disturbance to or placement of fill in the Truckee River and the existing irrigation and drainage ditches, such as Pioneer Ditch and the North Truckee Drain, whose habitat cover types largely fall within the USFWS Open Water/ Pond/Riverine, Emergent Wetland/Marsh, and Willow/Mixed Willow Scrub classifications. These resources comprise 24.3 acres of the 28.6 acres of waters of the United States affected. The 2.4 acres of Native Riparian Forest habitat affected is associated primarily with stands of Fremont cottonwoods along the tops of the riverbank within the active floodplain, and the 0.7-acre non-native vegetation cover type within waters of the United States consists of stands of ornamentals such as elm (*Ulmus spp.*) and purpleleaf plum trees (*Prunus cerasifera*) along the river bank adjacent to the State of Nevada correctional facility and the Reno Sparks Indian Colony lands. Also included is a small stand of *Tamarix spp.* within the floodplain terrace footprint. Finally, the 1.4 acres of disturbed/bare cover type affected is a rock berm (1.1 acres - now part of the Wal-Mart floodwall) along the Reno Sparks Indian Colony lands and unvegetated areas within the river channel.

Table 5-10. Affected Waters of the United States Cross-Referenced to USFWS Resource Classifications, Alternative 3-Floodplain Terrace Plan, Truckee Meadows Reach.

U.S. Fish and Wildlife Service Resource Classification	Resource Category	Acres Affected
Emergent Wetland/Marsh (EWM)	2	1.1
Open Water / Pond / Riverine (OWPR)	2	5.6[1]
Native Riparian Forest (NRF)	2	2.4
Upland Native Herbaceous / Shrub / Grasslands (UNHSG)	3	0
Willow/Mixed Willow Scrub (WMWS)	3	17.4
Upland Non-native Herbaceous (UNNH)	4	0.7
Disturbed/Bare (DB)	4	1.4
	Total	**28.6**

[1]Placement of riprap for scour protection within the Truckee River (3.7 acres) would not represent a loss of Open Water/Pond/Riverine habitat, although habitat function would be affected in the short term. Placement of North Truckee Drain into culverts, construction of floodplain terraces, and construction of levees and floodwalls would represent a permanent loss of 1.9 acres of Open Water/Pond/Riverine habitat with Water of the United States designation

In the long term, excavation of the lower floodplain terrace would lower approximately 40 acres along about 1.7 miles of south bank shoreline to an elevation that would expose habitat to seasonal inundation at a frequency of between 1/10 and 1/20 annual occurrance. As indicated in Figure 5-5, this inundation frequency would be categorized as Active Floodplain and could be considered a wetland or waters of the United States, provided other jurisdictional criteria are met.

Again, the acres of waters of the United States affected presented in Table 5-10 are a subset of the total acres of habitat cover types affected as shown in Table 5-8; however, the jurisdictional determination of the habitat cover types within waters of the United States is considered in determining effects to overall habitat value, as explained further in the Environmentally Sustainable Design discussion below. With implementation of environmentally sustainable design features, effects to waters of the United States would be less-than-significant in the Truckee Meadows reach. The 404(b)(1) analysis for this study is included in Appendix C.

Upland Native Herbaceous/Shrub/ Grasslands. Levee and floodwall construction, in addition to excavation of floodplain terraces, account for the loss of most of this habitat cover type in the Truckee Meadows reach. The majority of the upland habitat present in this reach is developed or highly disturbed land. What native upland habitat that is present is dominated by big sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus sp.*). Affected areas are generally located at the top of the river bank within a narrow strip of undisturbed land between riparian habitat and disturbed/developed land. This habitat is highly fragmented due to the extensive development present in this reach, except for the area downstream of the TMWRF facility where scour protection is proposed. Effects to this habitat cover type would be less-than-significant.

Wildlife. The project area contains both natural and non-natural habitats that support numerous common wildlife species. These species include a wide variety of terrestrial and aquatic invertebrates, birds and raptors, amphibians, reptiles, and mammals, some of which are listed in the Affected Environment section.

Numerous common migratory bird species. including raptors have potential to nest within the project area, including red-tailed hawk, red-shouldered hawk, great horned owl, American kestrel, and red winged blackbird. Common bats also have potential to roost in trees and snags within the project area.

Tree (and shrub) removal, other vegetation clearing, grading, or other construction activities could remove or cause abandonment of active bird nests or bat roosts. Within the program area, suitable nesting habitat for migratory birds occurs in riparian forest, mixed willow scrub, grassland, and pastureland. Similarly, riparian forests contain suitable bat roosting habitat.

Disturbance to or loss of habitat types described above would have direct and indirect, short-term adverse effects on wildlife within and near the disturbed areas. Adverse effects on wildlife associated with construction of this alternative would include, but would not be limited to, the following effects:

- Direct mortality resulting from the movement of construction equipment and vehicles through the program area.
- Direct mortality from the collapse of burrows, resulting from soil compaction.
- Loss of breeding and foraging habitat resulting from the filling or removal of emergent marsh and open water areas.
- Loss of breeding, foraging, or refuge habitat resulting from the permanent removal of riparian vegetation, oak woodland, grasslands, and non-orchard agricultural lands.
- Loss of potential nesting habitat for bird species.
- Abandoned eggs or young and subsequent nest failure for nesting birds, including raptors, as a result of construction-related noise or close proximity to construction activity.
- Loss or disruption of migration corridors.

Environmentally Sustainable Design. The proposed environmentally sustainable design approach, particularly with the floodplain terrace features and bioengineered scour protection, would create additional mixed willow and native riparian forest habitat in this reach. While the placement of riprap for scour prevention would represent a short-term loss of habitat function within the Truckee River, it is still one of the most ecologically and aesthetically desirable techniques for erosion control and under certain conditions can be ecologically preferred. Stabilizing stream channels with riprap can reduce sediment loads, improve water quality, and allow reestablishment of riparian vegetation. Stone used in riprap structures provides hard substrate habitat that can be important in some sand bed streams where it might be limited, and spaces between riprap stones provide velocity refuge and cover for aquatic invertebrates and small fishes.

As shown in Table 5-11, construction of the Floodplain Terrace Plan would result in a loss of Emergent Wetland/Marsh (1.1 acres), Upland Native Herbaceous/Shrub/ Grasslands (1.7 acres), Upland Non-native (36.4 acres), and Open Water/Pond/Riverine (2.5 acres) habitat cover types.

While these habitat cover types would be converted to Disturbed/Bare (136.3 acres) due to construction of levees, floodwalls, and the North Truckee Drain, the environmentally sustainable design and revegetation of the floodplain terraces would create 49.9 acres of willow/mixed willow scrub habitat and 12.4 acres of native riparian forest habitat. As discussed earlier, 40 acres of the 49.9 acres of willow/mixed willow scrub habitat would be on the lower floodplain terrace that would be exposed to seasonal inundation at a frequency of between one and five years. This inundation frequency would be categorized as Active Floodplain and could be considered a wetland or waters of the United States, provided other jurisdictional criteria are met.

Table 5-11. Habitat Acres Post-project - Alternative 3-Floodplain Terrace Plan, Truckee Meadows Reach

Habitat Cover Type	Acres Affected[1]	Habitat Acres Created from Environmentally Sustainable Design[1]	Habitat Acres Post-Construction[1]
Emergent Wetland/ Marsh (EWM)	1.1 (1.1)	0	0
Upland Native Herbaceous / Shrub / Grasslands (UNHSG)	1.7	0	0
Upland Non-native Herbaceous (UNNH)	36.4 (0.7)	0	0
Disturbed/ Bare (DB)	128.6 (1.4)	0	136.3[2]
Native Riparian Forest (NRF)	10.0 (2.4)	12.4	12.4
Willow/ Mixed Willow Scrub (WMWS)	18.3 (17.6)	49.9 (40)	49.9 (40)
Open Water / Pond / Riverine (OWPR)	6.2 (5.6)	0	3.7[3]

[1]Acreages in parentheses indicate number of acres of the habitat type that could be considered waters of the United States.
[2]Post-construction Disturbed/Bare habitat cover type acreage represents flood risk management features constructed.
[3]Placement of riprap for scour protection within the Truckee River (3.7 acres) would not represent a loss of Open Water/Pond/Riverine habitat, although habitat function would be affected in the short term. Placement of North Truckee Drain into culverts, construction of floodplain terraces, and construction of levees and floodwalls would represent a permanent loss of 2.5 acres of Open Water/Pond/Riverine habitat.

Using the changes in habitat acres presented in Table 5-11, the change in AAHU's was calculated using the HEP assumptions presented in Appendix D. As shown in Table 5-12, there would be a net increase of almost 80 AAHU's under Alternative 3 future with project conditions when compared to the future without project conditions.

Table 5-12. Change in Annual Average Habitat Units in the Truckee Meadows Reach – Alternative 3-Floodplain Terrace Plan

Without Project Annual Average Habitat Units	Alternative 3 Annual Average Habitat Units	Net Change in Annual Average Habitat Units With Project
76.85	156.74	+79.89

Since 82 percent (165 acres out of 202.3 acres) of the existing habitat that would be converted to flood risk management features is either non-native or disturbed/bare, and losses of the other habitat cover types would be compensated by the revegetation of the excavated floodplain terraces with willow scrub and native riparian forest habitat, no mitigation is proposed for effects this alternative would have to vegetation and wildlife in the Truckee Meadows reach. Overall, with implementation of environmentally sustainable designs and implementation of avoidance and minimization measures identified in Section 5.5.3 Mitigation Measures, effects to vegetation and wildlife within the Truckee Meadows reach would be less-than-significant.

Lower Truckee River Reach

As discussed in Section 5.4 Hydrology and Geomorphology, the effective discharge for the Lower Truckee River reach would not be affected by this alternative. This avoids long-term sedimentation and erosion changes, which would be an indicator of how induced flows could effect

vegetation and wildlife. Based on this correlation, indirect effects to vegetation and wildlife in this reach are expected to be less than significant.

Alternative 2-Detention Plan

Truckee Meadows Reach

Effects to habitat cover types in the Truckee Meadows reach from the Detention Plan are discussed below. The acreage of habitat types affected is shown by feature in Table 5-13.

Table 5-13. Effects to Existing Habitat Cover Types in the Truckee Meadows Reach – Alternative 2-Detention Plan .

Flood Risk Management Features	Habitat Cover Types Affected - Acres						
	Emergent Wetland/ Marsh (EWM)	**Upland Native Herbaceous / Shrub / Grasslands (UNHSG)**	**Upland Non-native Herbaceous (UNNH)**	**Disturbed/ Bare (DB)**	**Native Riparian Forest (NRF)**	**Willow/ Mixed Willow Scrub (WMWS)**	**Open Water / Pond / Riverine (OWPR)**
Bank Scour Protection – Riprap	0	0.6	3.5	1.7	0.8	2.8	1.9
Bank Scour Protection - Bioengineered	0	0	1.9	0.2	0	0.4	0.8
Bridge Scour Protection	0	0	0.1	0.4	0.1	0.5	1.0
In Channel Floodwall	0	0.1	0.7	3.3	0.5	1.5	0.3
Levee	3.4	0.4	23.3	69.8	2.4	8.2	1.6
Realigned North Truckee Drain	0	0	0.7	4.1	0	0.1	0.3
On-Bank Floodwall	0.3	0.2	7.2	19.5	0.8	0	0.7
UNR Farms Detention Basin Structures	0.3	0	19.1	128.1	1.7	2.5	0.8
Huffaker Detention Structures	0.7	4.4	6.0	1.8	0	0	0.6
Boynton Slough culvert	0.2	0	3.0	0	0	0	1.1
Recreation footprint	0	0	2.2	23.0	0	0.8	0
Total	**4.9**	**5.7**	**67.7**	**251.9**	**6.3**	**16.8**	**9.1**

Upland Non-Native and Disturbed/Bare Habitat. Of the approximately 366.2 acres of habitat disturbed by project features in this alternative, approximately 323.3 acres would be either on existing non-native upland habitat or disturbed/bare habitat.

Mixed Willow Scrub. Within the Trucke Meadows reach, the existing mixed willow habitat is located primarily along the river margins, Steamboat Creek, Boynton Slough, and along the drainage and irrigation ditches, such as Pioneer Ditch and the North Truckee Drain. As indicated in Table 5-13, project features would disturb approximately 16.9 acres of this habitat. Levee and floodwall construction would permanently remove about 9.7 acres of mixed willow habitat. In addition, realigning the North Truckee Drain, and installing recreation features would result in the loss of approximately 1.0 acres of mixed willow habitat.

The scour protection features would affect approximately 3.7 acres; however, the bridge and bank scour protection design is expected to leave existing native vegetation in place to the extent possible, placing rock around the vegetation. The scour protection designs also call for placement of willow pole cuttings in the spaces between rocks to aid in the reestablishment of vegetation post-construction.

The northern berm of the UNR Farms detention basin would remove approximately 2.5 acres of mixed willow scrub habitat along the river corridor; however, construction of the Huffaker detention basin dam and western dike would not effect this habitat type. The realignment of the North Truckee Drain south of the UPRR tracks would remove approximately 0.1-acre of willow scrub habitat within the existing drainage ditch.

Native Riparian Forest. Native riparian forest habitat in the Truckee Meadows reach is primarily dominated by Fremont cottonwoods. This habitat also tends to be associated with the river margin and irrigation and drainage ditches, although typically further removed from the water bodies than the mixed willow habitat. Proposed flood risk management and recreation features have the potential to remove up to 6.3 acres of native riparian forest habitat, mostly in conjunction with construction of levees and floodwalls and the northern berm of the UNR Farms detention basin. Similar to avoidance and minimization efforts discussed for the mixed willow scrub habitat above, design and construction of scour protection features will seek to integrate existing native riparian forest habitat into its design to the extent practicable. Reasonable effort will be made during detailed design and construction to further avoid and minimize the loss of existing habitat to the extent that project performance requirements would allow.

Emergent Wetland/Marsh. Of the 4.9 acres of emergent wetland/marsh habitat that would be affected by this alternative, 3.7 acres would be lost as a result of levee and on-bank floodwall construction, primarily along Steamboat Creek, Boynton Slough, and the drainage and irrigation ditches north of Mill Street. Construction of the detention basins would also affect approximately 1.0 acre of this habitat type on Steamboat Creek.

Open Water/Pond/Riverine. The Detention Plan flood risk management features would affect approximately 9.1 acres of open water habitat, primarily riverine or stream habitat along the Truckee River, Boynton Slough, Steamboat Creek, and the North Truckee Drain. Construction of levees and floodwalls, placement of portions of Boynton Slough and the North Truckee Drain into culverts, and construction of the detention basin structures at UNR Farms and Huffaker would result in the permanent loss of 5.4 acres of this habitat cover type. Proposed scour protection features along the river, including bioengineered features, would affect 3.7 acres of riverine habitat; however, these measures would not result in a permanent loss of open water habitat, but could, without proper environmentally sustainable design and implementation, cause a reduction in the quality of the effected habitat.

Waters of the United States. Based on the planning level delineation of aquatic resources (Lichvar and Ericsson 2005), the flood risk management and recreation features of the Floodplain Terrace Plan in the Truckee Meadows reach would disturb or place fill in approximately 39.8 acres of waters of the U.S., as shown in Table 5-14. Proposed fishing (220 square feet of rock/gravel per site) and kayak access (500 square feet of rock/gravel per site) recreation features represent approximately 0.1 acre of

that disturbance.

Table 5-14. Placement of Fill in Waters of the United States, Alternative 2-Detention Plan , Truckee Meadows Reach.

Feature	Acres
Bank Scour Protection - Riprap	5.4
Bank Scour Protection - Bioengineered	1.2
Bridge Scour Protection	1.7
On bank Floodwall	1.5
In channel Floodwall	2.2
Levees	16.7
UNR Farms Detention Basin Structures	5.5
Realigned North Truckee Drain	0.4
Huffaker Detention Structures	1.2
Boynton Slough Culvert	3.9
Recreation	0.1
Total	**39.8**

Note: Acreages based on delineations from Lichvar, Robert and Michael Ericsson. 2005. *Delineation of Aquatic Resources Using Vegetation Communities and Fluvial Surfaces Within Selected Reaches of the Truckee River, Washoe and Storey Counties, Nevada.*

The acres of waters of the United States affected are a subset of the total acres of habitat cover types affected as shown in Table 5-13.

As shown in Table 5-15, the vast majority of effects to waters of the United States are attributed to disturbance to or placement of fill in the Truckee River, Steamboat Creek, Boynton Slough, and the North Truckee Drain, whose habitat cover types largely fall within the USFWS Open Water/ Pond/Riverine, Emergent Wetland/Marsh, and Willow/Mixed Willow Scrub classifications. The 1.9 acres of Native Riparian Forest habitat affected is associated primarily with stands of Fremont cottonwoods along the tops of the riverbank within the active floodplain. The 6.0 acres of non-native vegetation cover type within waters of the United States consists of stands of ornamentals such as elm (*Ulmus spp.*) and purpleleaf plum trees (*Prunus cerasifera*) along the river bank adjacent to the State of Nevada correctional facility and the Reno Sparks Indian Colony lands. Also included are patches of *Tamarix spp.*, tall whitetop (*Cardaria pubescens*), and *Kochia spp.* throughout the footprint of this alternative. Approximately 1.5 acres of the invasive grass *Eragrostis cilianensis* would be disturbed along Steamboat Creek. Finally, the 2.3 acres of disturbed/bare cover type affected is a rock berm (1.1 acres - now part of the Wal-Mart floodwall) along the Reno Sparks Indian Colony lands, unvegetated areas within the river channel, and approximately 1.0 acre of disturbed land along the Boynton Slough channel.

Again, the acres of waters of the United States affected presented in Table 5-15 are a subset of the total acres of habitat cover types affected as shown in Table 5-13; however, the jurisdictional determination of the habitat cover types within waters of the United States is considered in determining effects to overall habitat value.

Table 5-15. Affected Waters of the United States Cross-Referenced to USFWS Resource Classifications, Alternative 2-Detention Plan , Truckee Meadows Reach.

U.S. Fish and Wildlife Service Resource Classification	Resource Category	Acres Affected
Emergent Wetland/Marsh (EWM)	2	4.9
Open Water / Pond / Riverine (OWPR)	2	8.5
Native Riparian Forest (NRF)	2	1.9
Upland Native Herbaceous / Shrub / Grasslands (UNHSG)	3	0
Willow/Mixed Willow Scrub (WMWS)	3	16.2
Upland Non-native Herbaceous (UNNH)	4	6.0
Disturbed/Bare (DB)	4	2.3
	Total	**39.8**

[1]Placement of riprap for scour protection within the Truckee River (3.7 acres) would not represent a loss of Open Water/Pond/Riverine habitat, although habitat function would be affected in the short term. Placement of North Truckee Drain into culverts, construction of floodplain terraces, and construction of levees and floodwalls would represent a permanent loss of 1.9 acres of Open Water/Pond/Riverine habitat with Water of the United States designation

Upland Native Herbaceous/Shrub/Grasslands. Levee and floodwall construction, in addition to excavation of floodplain terraces, account for the loss of most of this habitat cover type in the Truckee Meadows reach. The majority of the upland habitat present in this reach is developed or highly disturbed land. What native upland habitat that is present is dominated by big sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus sp.*). Affected areas are generally located at the top of the river bank within a narrow strip of undisturbed land between riparian habitat and disturbed/developed land. This habitat is highly fragmented due to the extensive development present in this reach, except for the area downstream of the TMWRF facility where scour protection is proposed.

Overall Effects to Habitat Value in the Truckee Meadows Reach

While the placement of riprap for scour prevention would represent a short-term loss of habitat function within the Truckee River, it is still one of the most ecologically and aesthetically desirable techniques for erosion control and under certain conditions can be ecologically preferred. Stabilizing stream channels with riprap can reduce sediment loads, improve water quality, and allow reestablishment of riparian vegetation. Stone used in riprap structures provides hard substrate habitat that can be important in some sand bed streams where it might be limited, and spaces between riprap stones provide velocity refuge and cover for aquatic invertebrates and small fishes.

As shown in Table 5-16, construction of the Detention Plan would result in a loss of Emergent Wetland/Marsh (4.9 acres), Upland Native Herbaceous/Shrub/ Grasslands (5.7 acres), Upland Non-native (68.7 acres), Native Riparian Forest (6.3 acres), Willow/Mixed Willow Scrub (16.9 acres), and Open Water/Pond/Riverine (5.4 acres) habitat cover types. These habitat cover types would be converted to Disturbed/Bare (362.5acres) due to construction of levees, floodwalls, the North Truckee Drain, and the detention basins at UNR Farms and Huffaker Hills.

Using the changes in habitat acres presented in Table 5-16, the change in AAHU's was calculated using the HEP assumptions presented in Appendix D. As shown in Table 5-17, there would be a net loss of approximately 78 AAHU's under Alternative 2 future with project conditions when compared to the future without project conditions.

Table 5-16. Habitat Acres Post-project - Alternative 2-Detention Plan , Truckee Meadows Reach

Habitat Cover Type	Acres Affected[1]	Habitat Acres Post-Construction
Emergent Wetland/ Marsh (EWM)	4.9 (4.9)	0
Upland Native Herbaceous / Shrub / Grasslands (UNHSG)	5.7	0
Upland Non-native Herbaceous (UNNH)	68.7 (6.0)	0
Disturbed/ Bare (DB)	254.6 (2.3)	362.5[2]
Native Riparian Forest (NRF)	6.3 (1.9)	0
Willow/ Mixed Willow Scrub (WMWS)	16.9 (16.3)	0
Open Water / Pond / Riverine (OWPR)	9.1 (8.5)	3.7 (3.7)[3]

[1]Acreages in parentheses indicate number of acres of the habitat type that could be considered waters of the United States.
[2]Post-construction Disturbed/Bare habitat cover type acreage represents flood risk management features constructed.
[3]Placement of riprap for scour protection within the Truckee River (3.7 acres) would not represent a loss of Open Water/Pond/Riverine habitat, although habitat function would be affected in the short term. Placement of North Truckee Drain into culverts, construction of floodplain terraces, and construction of levees and floodwalls would represent a permanent loss of 5.4 acres of Open Water/Pond/Riverine habitat.

Table 5-17. Change in Annual Average Habitat Units in the Truckee Meadows Reach – Alternative 2-Detention Plan

Without Project Annual Average Habitat Units	Alternative 3 Annual Average Habitat Units	Net Change in Annual Average Habitat Units With Project
80.64	2.59	-78.05

Mitigation for effects to high value habitat as a result of this alternative are discussed in Section 5.5.3 Mitigation Measures. With implementation of mitigation measures, this alternative would not result in a substantial loss of native vegetation or substantially reduce the quality and quantity of important habitat or access to such habitat for wildlife species. Wetlands mitigation described below would compensate for the effects to waters of the United States. Therefore, effects to vegetation and wildlife in this reach would be considered less-than-significant for this alternative.

Lower Truckee River Reach

Effects to vegetation and wildlife in the Lower Truckee reach as a result of this alternative would be similar to Alternative 3-Floodplain Terrace Plan.

5.5.3 Mitigation Measures

In recommending mitigation for adverse effects to vegetation and wildlife, sequential mitigation steps recommended in the President's Council on Environmental Quality in the NEPA regulations (40 CFR Part 1508.20 [a-e]) are followed. These mitigation steps (in order of preference) are: a) avoidance of effect; b) minimization of effect; c) rectification of effect; d) reducing or eliminating the effect over time; and e) compensating for the effect.

The measures listed below to avoid and minimize effects to vegetation and wildlife include recommendations provided by USFWS in the draft CAR (Appendix B to to the draft EIS). However, the draft CAR was prepared using a preferred alternative no longer being considered by the USACE because additional analysis subsequently determined that the alternative did not meet Federal economic criteria.

The USACE and local sponsor have since developed a feasible preferred alternative focusing on flood risk management and recreation features in the Truckee Meadows project area. Ecosystem restoration and fish passage features included as part of the previous alternative are no longer included in the new preferred alternative. As a result, some of USFWS's recommendations related to vegetation and wildlife no longer apply and would not be implemented. Section 7.4 has been revised to provide additional details about those recommendations that would not be implemented.

Measures that would be implemented for all action alternatives include:

1. Construction activities immediately in and adjacent to the river channel would be done during low flows (i.e., between July 1 and September 30) while maintaining downstream water flow. De-watering associated with construction would not occur during the spring season to avoid migration periods of native fish (especially Federally listed fish species). Personnel and equipment would be on-hand to conduct fish rescues if needed, placing fish outside areas of construction. Fish salvage operations would be coordinated with USFWS and NDOW at least 24 hours prior to implementation.

2. Excavation within the stream channel would be limited to the extent possible. If all the excavated material is not relocated to another portion of the project area, it would be completely removed from the floodplain so it does not reenter the river during the next high flow event. These materials would be located on previously disturbed upland areas to the extent possible.

3. Work activities outside the river channel would also be scheduled to minimize adverse effects to wildlife resources. Construction would occur after nesting and rearing of young birds have been completed. To ensure effects to nests or young do not occur, surveys would be conducted prior to construction to determine whether any birds are nesting in the area.

4. BMPs for minimizing the spread of noxious weeds would be implemented.

5. In areas dominated by the invasive, non-native species tall-whitetop, all plant materials removed during construction would be left on-site in a location that would not allow plant material to enter waterways. To avoid spreading weeds, all machinery and vehicles that leave the site would be washed on site to remove attached seeds and roots.

6. The Comprehensive Wildlife Sensitive Weed Control Plan (Otis Bay Consulting 2006) would be updated and implemented. Manual removal would be used in sensitive areas near waterways and wetlands. If chemicals are used in these areas, a wick applicator and a water labeled formula 2,4-D would be used for infested areas located within 30 feet of the Truckee River and associated wetlands. Chemicals used in other areas would be applied according to the manufacturer's specifications by State-approved weed control experts.

7. If hay/straw bales are used for sediment control, they would be certified weed-free to reduce establishment/reestablishment of invasive weeds.

8. Effects to woody vegetation at and adjacent to the construction staging areas would be avoided to the extent possible. If any woody vegetation is inadvertently disturbed or lost in the staging areas, the planting of riparian vegetation, including woody vegetation, on the floodplain terraces as part of environmentally sustainable project design is expected to sufficiently compensate for any disturbance to woody vegetation in staging areas. Watering and monitoring of replanting success would be necessary until replanted areas are established.

9. Erosion control and maintenance measures would be implemented on a site-specific basis. Pertinent materials would be certified weed-free. Hydromulch would be secured with an organic tackifier.

10. Effects to the grassland/herbaceous cover-type would be minimized by reseeding all areas with native grasses and forbs, including construction staging and disposal areas.

11. Excess spoil materials would be properly stored. Measures would be implemented to ensure that spoil material does not enter the Truckee River, Steamboat Creek, or adjacent wetlands.

12. A spill prevention and containment countermeasure plan that addresses all potential mechanisms of contamination would be developed. Suitable containment materials would be on-hand in the event of a spill. All discarded material and any accidental spills would be removed and disposed of at approved sites.

13. Instream time and the number of stream crossings for heavy equipment would be minimized to the extent possible. Stream crossings would be perpendicular to the stream and in designated areas using gently sloping and stable banks.

14. Equipment and vehicles operated within the floodway would be checked and maintained daily to prevent leaks of fuels, lubricants, and other fluids to the river.

15. Temporary roads would be constructed to the minimal number, width, and total length consistent with construction activities. Roads would be minimized in sensitive areas (e.g., riparian). Water bars and other erosional controls would be installed for permanent roads or trails.

16. Coordination efforts with USFWS, NDOW and the PLPT would continue throughout the preconstruction engineering and design phase with emphasis on features directly affecting fish and wildlife resources.

17. Measures for monitoring and associated adaptive management would be implemented to verify the performance of mitigation, construction BMPs, and other conservation features. Lessons learned from the earlier phases of construction would be applied to later phases.

Rectification of effects to vegetation and wildlife would be accomplished primarily by restoring temporarily disturbed areas to pre-project conditions following completion of construction. This would include ground decompaction, recontouring, and reseeding of disturbed sites. Reducing the effect over time and compensation of high value habitat lost are discussed below for each action alternative.

Alternative 3-Floodplain Terrace Plan

In the Truckee Meadows reach, construction of the Floodplain Terrace Plan would result in a loss of Emergent Wetland/Marsh (1.1 acres), Upland Native Herbaceous/Shrub/ Grasslands (1.7 acres), Upland Non-native (36.4 acres), and Open Water/Pond/Riverine (2.5 acres) habitat cover types. While these habitat cover types would be converted to Disturbed/Bare (136.3 acres) due to construction of levees, floodwalls, and the North Truckee Drain, the environmentally sustainable design and revegetation of the floodplain terraces would create 49.9 acres of willow/mixed willow scrub habitat and 12.4 acres of native riparian forest habitat. As discussed earlier, 40 acres of the 49.9 acres of willow/mixed willow scrub habitat would be on the lower floodplain terrace that would be exposed to seasonal inundation at a frequency of between one and five years. This inundation frequency would be categorized as Active Floodplain and could be considered a wetland or other Water of the United States, provided other

jurisdictional criteria are met. Since 82 percent (165 acres out of 202.3 acres) of the existing habitat that would be converted to flood risk management features is either non-native or disturbed/bare, and losses of the other habitat cover types would be compensated by the revegetation of the excavated floodplain terraces with willow scrub and native riparian forest habitat, no mitigation is proposed for effects this alternative would have to vegetation and wildlife in the Truckee Meadows reach.

Alternative 3 would have long-term benefits on the vegetation and wildlife along this reach of the Truckee River. The net increase of 12.4 acres of Native Riparian Forest and 49.9 acres of Willow/Mixed Willow Scrub would provide critical riparian habitat for a diversity of wildlife. Because of the nearby water, riparian systems are the most productive habitats in the region. Along this reach, this would include both the production of food sources, as well as new vegetation for hiding, resting, and breeding. The root systems of the riparian trees and shrubs would contribute to bank stability, slowing or eliminating erosion along the bank. The new riparian areas would also provide corridors for wildlife area movements and longer range migration. By facilitating such movements, these riparian corridors would connect and improve the genetic health of wildlife populations.

Alternative 2-Detention Plan

Truckee Meadows Reach

In the Truckee Meadows reach, construction of the Detention Plan would result in a loss of Emergent Wetland/Marsh (4.9 acres), Upland Native Herbaceous/Shrub/ Grasslands (5.7 acres), Upland Non-native (68.7 acres), Native Riparian Forest (6.3 acres), Willow/Mixed Willow Scrub (16.9 acres), and Open Water/Pond/Riverine (5.4 acres) habitat cover types. These habitat cover types would be converted to Disturbed/Bare (362.5acres) due to construction of levees, floodwalls, the North Truckee Drain, and the detention basins at UNR Farms and Huffaker Hills. The loss of this habitat would be mitigated by establishment of new habitat or enhancement of existing habitat within the Truckee Meadows reach. Table 5-18 summarizes the mitigation required based on the habitat affected and the mitigation ratios discussed below.

Table 5-18. Habitat Mitigation Estimate for Alternative 2-Detention Plan , Truckee Meadows Reach

U.S. Fish and Wildlife Service Resource Classification	Resource Category	Acres Affected[1]	Mitigation Ratio – Acres[2,3]	Mitigation Acreage
Emergent Wetland/Marsh (EWM)	2	4.9 (4.9)	2:1	9.8
Open Water / Pond / Riverine (OWPR)	2	9.1 (8.5)	2:1	18.2
Native Riparian Forest (NRF)	2	6.3 (1.9)	2:1	12.6
Upland Native Herbaceous / Shrub / Grasslands (UNHSG)	3	5.7	1:1	5.7
Willow/Mixed Willow Scrub (WMWS)	3	16.9 (16.3)	1:1 (2:1)	33.2
Upland Non-native Herbaceous (UNNH)	4	68.7 (6.0)	(2:1)	12.0
Disturbed/Bare (DB)[4]	4	254.6 (2.3)	(1:1)	2.3

[1]Acres in parentheses are the amount of total habitat acreage that has a wetland or other Water of the United States designation.
[2] Ratios used only to determine comparative costs.
[3]Acreage ratios in parentheses represent mitigation ratio for habitat that has a wetland or other Water of the United States designation.
[4]Affected Disturbed/Bare habitat with wetland or other Water of the United States designation was either an existing flood protection structure, or bare/disturbed bank along the Truckee River, Boynton Slough, or Steamboat Creek that is below the ordinary high water mark. Due to the low value of this habitat, the mitigation ratio was reduced to 1:1 if effects cannot be avoided.

For purposes of estimating and comparing project costs, approximate mitigation acreages required were determined, based on USFWS Mitigation Policy and wetland or other Water of the United States jurisdictional determination. Loss of high value habitat (Resource Category 2) would be mitigated

at an acreage ratio of 2 to 1. Habitat of Resource Category 3 would be mitigated at an acreage ratio of 1 to 1, unless the acreage has a wetland or other Water of the United States designation, in which case the acreage mitigation ratio would be 2 to 1 for that habitat lost. Effects to Resource Category 4 habitat would be minimized to the extent practicable, but compensation would only be for acreages that have a wetland or other Water of the United States designation.

5.6 FISHERIES

5.6.1 Affected Environment

The native fishes of the Truckee River have persisted since the age of Lake Lahontan (Otis Bay, 2004). The Truckee River watershed continues to function as a closed hydrologic system with evaporation providing atmospheric outflow from Pyramid Lake. The Truckee River passes through alpine, agricultural, urban, and desert zones as it flows through its course. Native Lahontan-era fishes became quite diverse morphologically, occupying specific niches which reduced interspecies competition for food and other resources (Moyle, 2002). These fish adapted to and thrived in the highly variable flows of the unregulated river system.

Over the past century, however, human alterations to the river and introduced fish species have contributed to the reduction in population of many native fish. These changes and the secondary effects they have caused (for example, higher water temperatures), along with the lowering of the elevation of Pyramid Lake, have led to the extinction of the Pyramid Lake subspecies of LCT in the 1940s (Wheeler, 1987; USACE, 1995). Different strains of LCT introduced into Pyramid Lake from Independence, Heenan, Summit, and Walker Lake in the 1950s (Coleman and Johnson, 1988) were listed as Federally threatened in 1970. The cui-ui from Pyramid Lake, which spawns in the lower Truckee River, was listed as Federally endangered in 1967. Other native fish species, such as the tui chub and mountain whitefish, have experienced significant population declines over the past century (Otis Bay, 2004).

Public values have only recently shifted from an emphasis on water resource development to management of Western waters (USBOR, 2006). Various habitat improvement and fish passage projects are currently proposed or are underway, from small-reach reconstruction efforts to systemic approaches involving recovery of more naturalized instream flow patterns in an effort to recover native fish populations (Rood et al., 2003). However, loss of habitat due to pollution, erosion, temperature elevation, and construction of dams will continue to be a threat to the Truckee River system and to the entire region's fisheries (Washoe County, 2006).

Truckee River Fish Species

Both native and non-native fish species may be found in the Truckee River system (Table 5-19). Nine of the species found in the Truckee River are native, and the most common include Paiute sculpin, Lahontan redside shiner, Tahoe sucker, speckled dace, and mountain sucker (Moyle, 2002; Interior & State, 2008). The mountain whitefish is also common; however, population levels can vary dramatically over time depending on river conditions (Interior & State, 2008). Only three or four native species may be sampled together at any particular point along the Truckee river system (Hughes and Whittier, 2005).

Many non-native fish species were introduced into the Truckee river basin from the late 1800s (USFWS, 2003). Rainbow and brown trout are the most prevalent of the nonnative fish upstream from Derby Dam and are the focus of the recreational fishery (Interior & State, 2008). Brown trout have been observed spawning in the fall, and stream-bred rainbow and brown trout fry have been collected in the Truckee in and around Reno (USACE, 2001). Natural recruitment of these fish has been supplemented with annual plantings of hatchery-reared individuals in certain areas to improve recreational fishing

(Interior & State, 2008). Introduced trout are reported to adversely affect the distribution and abundance of native aquatic species in the Sierra Nevada (Moyle, 2002; Knapp, 1994). In an attempt to reduce these effects, NDOW began to stock triploid (sterile) rainbow trout in lieu of a traditional rainbow trout stocking program in 2002. This experimental program was designed to reduce hybridization with native LCT (NDOW, 2005a). However, hybridization with LCT continued to occur "naturally" where both species came in contact through stocking.

In 1995, a cooperative 5-year effort was initiated between USFWS, the PLPT, and NDOW to determine the feasibility of restoring LCT to the Truckee River (NDOW, 2001). According to the study design, 10,000 LCT sourced from Pyramid Lake were planted into each of the five Truckee River zones: (1) Wadsworth to Pyramid Lake, (2) Derby Dam to Wadsworth Bridge, (3) East McCarran Bridge to Derby Dam, (4) Mayberry Bridge to East McCarran Bridge, and (5) Nevada/California State line to Mayberry Bridge (NDOW, 2001).

Table 5-19. Relative Abundance of Native and Non-native Fish by Reach within the Truckee Meadows Flood Control Project Project area.

Common Name ***Genus species***	**Verdi to Vista**	**Vista to Pyramid Lake**
Native Fish		
Cui-ui *Chasmistes cujus*		U, S
Lahontan cutthroat trout *Oncorhynchus clarki henshawi*	U, P	U, P
Lahontan redside shiner *Richardsonius egregious*	C	C
Lahontan Tui chub *Siphateles bicolor*		U
Mountain sucker *Catostomus Platyrhynchus*	C	C
Mountain whitefish *Prosopium williamsoni*	U	U
Paiute sculpin *Cottus beldingi*	U	
Speckled dace *Rhinichthys osculus*	C	C
Tahoe sucker *Catostomus tahoensis*	C	C
Non-native Fish		
Black crappie *Ictalurus melas*	U	U
Brook trout *Salvelinus fontinalis*		
Brown bullhead *Ictalurus nebulosus*		U
Brown trout *Salmo trutta*	C, P	C, P
Carp *Cyprinus carpio*	C	C
Channel catfish *Ictalurus punctatus*		U
Fathead minnow *Pimephales promelas*	U	C
Golden shiner *Notemigonus Crysoleucas*	U	C
Goldfish *Carassius auratus*	U	
Green sunfish *Lepomis cyanellus*	U	U
Largemouth bass *Micropterus salmoides*	U	U
Mosquitofish *Gambusia affinis*	U	C
Rainbow trout *Oncorhynchus mykiss*	C, P	U
Sacramento perch *Archoplites interruptus*		U
Smallmouth bass *Micropterus dolomieu*	U	U

Sources: Otis Bay, 2004; Interior & State, 2008; Hughes and Whittier, 2005; USFWS, 2007.
Occurrence classification: C = Common; U = Uncommon; P = Planted; S = Spawning only.

A follow-up creel census each year was used to determine catch rates. Results over the 5-year period indicated that the catch consisted of 23 percent LCT compared to 64 percent rainbow trout and 12 percent brown trout (NDOW, 2001). The LCT population did not naturally reproduce but continued to

depend on hatchery propagation for maintenance. These fish continue to be used as the source for NDOW's stocking program which have been planted in various locations on the river with increased frequency over the years (USFWS, 2007). This has been done concurrent with the State's de-emphasis on stocking of and use of sterile (triploid) rainbow trout.

Recent genetic work using microsatellite DNA analysis suggests transplanted LCT populations found in Bettridge and Morrison Creeks in the Pilot Peak mountains along the Utah-Nevada border originated from the Truckee River basin (Peacock and Kirchoff, 2007). Labeled as the "Pilot Peak" strain, this broodstock is the current focus of production at the USFWS Lahontan National Fish Hatchery which raises and stocks these fish in the Truckee River and other locations.

Fish Distribution and Habitat Requirements

NDOW has been the primary agency conducting annual population sampling utilizing electrofishing techniques on the Truckee River in Nevada since 1971 (NDWRP, 1999; Hughes and Whittier, 2005). In addition to electrofishing, NDOW obtains catch information (creel data) from anglers to provide an indication of the composition of the fishery. Anglers are interviewed or complete questionnaires that are either placed in drop boxes or mailed to NDOW. The following is a per reach comparison of population sampling and creel data compiled by NDOW, and the habitat requirements of fish species present:

Truckee Meadows Reach

The cities of Reno and Sparks, along with their adjacent valleys, make up the Truckee Meadows in Nevada – the most populous area of the Truckee River Basin (USGS, 1998). Bed material size decreases through the reach, and the channel bed is armored at base flow discharge (WET, 1990). Water temperature increases in this section, as does urban and agricultural runoff (USFWS, 2003). Physical removal of gravel and sandbars using heavy equipment and the riprapping of banks occurred after the New Years Flood of 1997; the result was a further degradation of riparian and in-channel habitat.

This reach contains the greatest species diversity, but non-native fish species outnumber native fish species (Hughes and Whittier, 2005). Within this reach, trout numbers decrease; sculpin are absent; and the occurrence of warm water species increases. Common species found in this reach are the Lahontan redside shiner, speckled dace, Tahoe sucker, and mountain sucker (USACE, 1995). Although mountain sucker is the only herbivorous fish in the Truckee River, it is commonly occurring, and the calibration data indicated that it became very abundant at some sites when excess nutrients and sunlight stimulated excess algal growth (Hughes and Whittier 2005). Mountain sucker populations increased with disturbance.

Sensitive species are generally the first to disappear as temperatures, sediments, turbidity, nutrients, and biochemical oxygen demand increase (Hughes and Whittier, 2005). Paiute sculpin, LCT, mountain whitefish, rainbow trout, and brook trout were determined to be sensitive in the Western Environmental Monitoring and Assessment Program analyses (Hughes and Whittier, 2005). Paiute sculpin, which are often used as an indicator species for habitat quality, decline in numbers from the upstream boundary to the downstream edge of this reach (Hughes and Whittier, 2005). Catchable rainbow trout and cutthroat trout are planted in this reach (NDOW, 2005a). However, telemetry studies conducted by NDOW determined that the average survival rate for the cutthroat were slightly more than one week (NDOW, 2005b).

Steamboat Creek is a highly disturbed and unstable waterway with near vertical banks. Throughout much of its length it is deeply incised, lacks meanders and has a high sediment load. Steamboat Creek is also the biggest non-point source of pollutants to the Truckee River due to intensive

agricultural use, as well as occurrances of high concentrations of arsenic, boron, iron, zinc, mercury and total phosphorus. As a result, the stream's physical and biological functions are substantially impaired that currently only supports a fishery of mainly bluegill, carp, sunfish, and suckers. Similarly, the North Truckee Drain is highly impaired from low water quality conditions and with the same assortment of fish species present.

Lower Truckee River Reach

This reach is subject to increases in temperature, as much as 10 degrees Fahrenheit in the summer as compared to upstream reaches. Factors that influence temperature increases are lack of riparian shading, and water diversions. Trout species require flows of at least 250 cfs of water during summer months, to survive in this area (USFWS, 2003). Outflow from the TMWRF water reclamation facility contributes a significant amount of flow to the Truckee River when flows are at a low level. When low flows occur during the winter, the Truckee River is also subject to ice formation in this reach (USGS, 1996).

Gradients drop dramatically downstream of Derby Dam. Derby Dam, located approximately 42 miles upstream from Pyramid Lake, diverts most of the flow from the Truckee River into the Carson basin. During non-runoff periods, flows reaching Derby Dam average 350 cfs. About 35 cfs remain in the river below the diversion during normal flows (Brock et al., 1992). The resulting flows, caused by major water diversions, such as Derby Dam and others upstream, are inadequate for cutthroat trout spawning (USFWS, 2003) and have dramatically lowered the level of Pyramid Lake. As a result, a silt delta has formed at the entrance to the lake, which prevents spawning migrations of the endangered cui-ui and threatened cutthroat trout (Galat, Lider, Vigg, and Robertson, 1981). Although spawning migrations do occur in years of above average flows, cui-ui and tui chub are mostly restricted to Pyramid Lake (Hughes and Whittier, 2005).

Downstream from Derby Dam, carp and mosquito fish are common (USACE, 1995). Common carp is regarded as a nuisance because it destroys aquatic macrophytes and increases turbidity in its feeding (Fuller, Nico, and Williams,1999). Western mosquitofish is aggressive and displaces or eliminates small native fishes (Courtenay and Meffe, 1989). Highly tolerant species such as these are typically incidental or rare in natural rivers, and they differ from intermediate species like Lahontan redside, speckled dace, and Tahoe sucker. When highly tolerant species begin to appear consistently, even in small numbers, it indicates the beginning of fundamental ecosystem change and serious concern (Hughes and Whittier, 2005). Truckee River omnivores include Tahoe sucker, common carp, tui chub, Sacramento blackfish, fathead minnow, and speckled dace. Although commonly occurring in natural conditions, they tend to increase at disturbed sites where a disrupted food base favors opportunistic feeders (Hughes and Whittier, 2005).

Brown trout and Lahontan trout have been planted in this reach but do not survive when water temperatures reach lethal levels (Gerstung, 1986a; USFWS, 1995). The abundance of salmonids decreased in a downstream fashion with the most down-gradient sampling site at Marble Bluff having no salmonids (USFWS, 2006). Although brown trout are considered to be moderately tolerant of degraded water quality conditions, the potential reduction of food availability, increased water temperatures, and increased nutrients from TMWRF discharges are likely affecting the condition of brown trout in this reach of the river (USFWS, 2006). Many of the trout found in the Lower Truckee River are parasitized or have lesions occurring (Hughes and Whittier, 2005).

Constraints to Truckee River Fishery Improvements

Introduced Fish Species

The introduction of non-native fishes into the Truckee system has changed the species composition of fishes found in the river (Moyle, 2002). Alien species indicate biological pollution and a serious diversion from natural conditions, especially when they constitute a substantial percentage of the assemblage, and including when they are deliberately introduced (Hughes and Whittier, 2005). Invasive species are strongly associated with species extinctions (Miller et al. 1989) and species extirpations in western rivers (Taylor, Courtenay, and McCann, 1984; Rinne, Hughes, and Calamusso, 2005). Truckee River invasives include Sacramento perch, green sunfish, largemouth bass, smallmouth bass, common carp, Sacramento blackfish, fathead minnow, black bullhead, white bass, yellow perch, western mosquitofish, brown trout, rainbow trout, and brook trout (Hughes and Whittier, 2005). Brown trout has replaced cutthroat trout in large rivers (Behnke, 1992) and Lake Tahoe (McAffee, 1966). Rainbow trout hybridizes with LCT contributing to their decline and replacement (Behnke, 1992). Alien black bullhead, yellow perch, green sunfish, white bass, smallmouth bass, and largemouth bass may sufficiently predate populations of small native fish to result in their extirpation (Dill and Cordone, 1997; Fuller, Nico, and Williams, 1999).

Water Quality

Dissolved solids and nutrient loads enter the Truckee River from numerous sources, including agricultural land drainage, urban runoff, groundwater discharge, and treated wastewater effluent. The TMWRF, located in Reno, is the major point source in the basin, discharging, on the average, 28 million gallons per day into the river (Research Triangle Institute, 1994). The effects of pollutants on fish life are most noticeable downstream from the outfall of the Reno-Sparks Wastewater Treatment Facility. Some species of trout, such as the brown trout, are more resistant to the effects of chemical pollution than are others; the LCT is among the least resistant. The distribution of trout in the Truckee River has changed, with the percentage of brown trout steadily increasing over the past several years. This species of trout, although not native, is now present in the greatest numbers and has become self-propagating (Washoe County, 2006). Channel straightening, stream bank denuding, and stream flow regulation have also contributed to stream temperatures that are marginal for cold water fisheries. Falling water levels at Pyramid Lake are leading to salt buildups which can also threaten some fish populations (Washoe County, 2006).

Agricultural activities are the primary non-point pollution source in the basin (Research Triangle Institute, 1994). In recent years, heavy growths of aquatic weeds and benthic algae have plagued the river. High nitrogen and phosphorus loads, combined with the lack of a major flushing event, have caused aquatic plants to proliferate, resulting in abundant accumulations of benthic plants and detritus (Research Triangle Institute, 1994). Plant respiration and decaying biomass have decreased DO levels in the river. The low levels of DO have, in turn, impaired the river's ability to support populations of LCT and cui-ui (Research Triangle Institute, 1994). Routine monitoring data collected by NDEP and DRI indicate that DO concentrations regularly fall below the 5.0 mg/L standard, especially at locations downstream from the Derby Dam, such as Wadsworth. Low DO has caused several fish kills, affecting populations of LCT and cui-ui (Research Triangle Institute, 1994).

Riparian Shading

Riparian vegetation historically provided trout in the Truckee River with overhanging cover, a source of food organisms, bank stabilization (which helps keep the river low in suspended sediment), and a source of large woody debris. Perhaps more importantly, riparian vegetation served to shade the Truckee River and may have maintained water temperatures suitable to trout for longer distances downstream of Reno than presently occurs in the summer (USACE, 2001). During the 1960's, USACE

completed flood control projects along several sections of the river, lowering and straightening the river channel. Connectivity to braided meanders and oxbow ponds was lost, and the riparian corridor, suddenly unable to reach the lowered water table, began to decline (Otis Bay, 2004). The present-day combination of summer low flows and limited riparian shading make the Truckee River inhospitable to trout in the summer below the Vista Narrows area (USACE, 2001).

Water Diversions

There are more than 30 potential fish passage obstacles on the Truckee River between Lake Tahoe and Pyramid Lake. Most of these obstacles are associated with water diversions for irrigation, power generation, and municipal uses. Certain structures are complete barriers to upstream migration while others are only partial barriers. Dams that block the entire width of a stream can prevent upstream migration and dispersal of fish when the dam is higher or stream velocities are greater than the fish can negotiate. Impassable dams limit the amount of habitat available to fish in a riverine system (USACE, 2001).

When access is limited, fish may be forced to use sub-optimal habitats, which exposes them to potential predation and competition from nonnative fish (USFWS, 2003). Although the Truckee River trout fishery is heavily supplemented with stocked fish, providing fish passage over dams would likely increase the current rate of natural reproduction. Also, as the water warms in the lower river, surviving trout could find more cold-water refuge if provided with access to the upper reaches of the Truckee River (USACE, 2001).

Most diversion structures on the Truckee River lack appropriate screening to keep fish species from becoming stranded within diversion when the water supplies recede and temperatures increase. Unscreened diversions adversely affect the fish populations by removing individual fish from the system (USACE, 2001). Fish entrained into agricultural or municipal and industrial diversions can experience nearly 100 percent mortality (USBOR, 2006). The potential exists for the loss of a significant number of trout when Truckee River diversions are operating (USACE, 2001). TMWA annually shutdown their diversion ditches for maintenance allowing NDOW to rescue entrained fish from certain death. On October 15, 2007, several hundred fish were rescued from the Fleish Ditch alone (Truckee River Flyfishers, 2007). To date, no analyses have been performed to determine the number of fish actually entrained into unscreened diversions on the Truckee River.

Conservation and Restoration Efforts on the Truckee River

Ecosystem Restoration

In 2003, TNC and its partner agencies successfully constructed the first phase of aquatic and terrestrial restoration along the lower Truckee River through a pilot project at McCarran Ranch. The pilot project implemented roughly 20 percent of overall restoration design. Implementation of the first phase of work has resulted in the recovery of the ground water table in the project area, increased populations and survivorship of native plants, and the return of many fish and bird species (North State Resources, 2007).

The remaining 80 percent of the McCarran Ranch restoration was completed in 2006, including the construction of a large meander in the river and construction of 14 riffle structures. In addition 14 acres of wetlands were constructed or enhanced and approximately 110 acres of floodplain and upland was made suitable for the reintroduction of 15 native plant species.

Similarly, the City of Reno and TNC were successful in obtaining funding from the Desert Terminal Lakes grant from the USBOR for river restoration. Restoration is currently taking place for the

Lockwood and 102 Ranch segments, and a portion of the Mustang Ranch segment. The projects in total will restore approximately eight miles of river.

The USBOR and BLM prepared an EA and signed a FONSI for restoration on these 3 segments in 2008. Construction of channel meanders at Lockwood and 102 Ranch were completed in 2008 and at the lower portion of Mustang Ranch in 2009. Revegetation efforts at all 3 locations are ongoing.

Water Flow Management

Section 205(a) of the Truckee-Carson-Pyramid Lake Water rights Settlement Act of 1990 (Public Law 101-618) directs the Secretary of the Interior to negotiate an operating agreement, now known as the TROA, to allow more efficient operation of select Truckee River reservoirs. The TROA would modify the reservoir operations to enhance coordination and flexibility while ensuring that existing water rights are served, and flood control and safety of dam requirements are met. The enactment of the TROA would enhance conditions in the Truckee River for the threatened LCT and endangered cui-cui by providing sufficient flows and improving water quality conditions downstream of Sparks, Nevada (North State Resources, 2007).

Riparian Restoration

In recent years, release of water from Truckee River reservoirs has been timed to promote the germination of cottonwood trees along the Truckee River. Over the past five years, these "cottonwood" flows were managed between the Federal Watermaster and the USFWS. There is evidence of cottonwood recruitment over this period in response to the flows (North State Resources, 2007). It is anticipated that an instream flow regime for cottonwood regeneration would be implemented during appropriate water years with or without the implementation of TROA.

Fish Passage

According to the USFWS, to achieve LCT recovery, passage above Derby Dam is critical for the species to access spawning and rearing habitat upstream in the Truckee River. A new "natural channel" fishway was completed at Derby Dam in 2003. Since 2003, the fishway has not been operated to pass LCT or cui-ui, and it is currently unknown when the fishway will be opened and operated on a regular basis. Prior to the fishway being operated at Derby Dam, the Truckee Canal above Derby Dam needs to be screened to prevent the loss of cui-ui and LCT into the canal (North State Resources, 2007).

The TMWA replaced and upgraded the existing Truckee River diversion structure for the Glendale Water Treatment Plant. A roughened fish passage channel has been constructed to permit unobstructed upstream and downstream migration of all life stages of native listed species and other fish resident to this reach of river. A fine plate fish screen and bypass pipeline were also constructed to prevent fish entrainment into the water treatment plant and return them to a downstream high velocity section of the river. The work also includes reconstruction of the south bank of the river, including tree planting and revegetation.

5.6.2 Environmental Consequences

This section evaluates the direct and indirect effects of the proposed alternatives on fishery resources in the project area. Effects to fishery resources were analyzed qualitatively in conjunction with the USFWS during coordination under the Fish and Wildlife Coordination Act. The final CAR is included in Appendix B.

Significance Criteria

Adverse effects on fishery resources were considered significant if implementation of an alternative plan would result in the following:

- Directly or indirectly reduce the growth, survival, or reproductive success of substantial populations of important commercial or game fish species.
- Substantially reduce the quality and quantity of important aquatic habitat or access to such habitat for fish species.
- Substantially reduce near shore woody vegetation over the project life.
- Substantial loss of instream woody material loading and recruitment.

No Action Alternative

Under the No Action Alternative, USACE would not implement the Truckee Meadows Flood Control Project. However, future conditions within the project area would likely experience a continued decline in fishery habitat value.

Truckee Meadows Reach

Without the project, no flood risk management features would be constructed to contain flows in the Truckee Meadows reach in excess of the current level of protection. Floodwall and levee construction proposed under the action alternatives would not occur. Fish would continue to become stranded in flood-prone areas during less than the 100-year event. Water quality would also remain about the same. Since no additional flood risk management features would be constructed, there would be a continued potential for contaminants to enter the river during high flow events. This is particularly the case in the Truckee Meadows reach where a large number of industrial areas are located adjacent to the river.

Without the project, some of the effects involving riparian vegetation would be somewhat offset by the continued implementation of the prescribed Truckee River ecosystem flow regimes. However, this effect would be difficult to quantify. Fish habitat would continue to degrade, while native fish populations would continue to compete with invasives for limited habitat. Game fish populations important to Nevada's recreational fisheries would continue to be supplemented by NDOW and USFWS.

Lower Truckee River Reach

Without the project, erosive damages and degraded water quality would continue to occur. Continual degradation in aquatic habitat would be reflected in higher water temperatures, degraded water quality, lack of cover, limited depth/velocity diversity, minimal allochthonous input, substrate embeddedness, sediment-dominated substrates (i.e., fines), and limited microhabitats diversity (e.g., pool-riffle complexes). Warm water exotic fish taxa such as brown trout, centrarchids (sunfishes, bass), bullhead, and carp would likely still dominate the Lower Truckee River reach.

Alternative 3-Floodplain Terrace Plan

The implementation of the Floodplain Terrace Plan is expected to have both adverse and beneficial effects on fishery resources. Direct and indirect effects would result from construction and operation of flood risk management features proposed under this alternative.

Truckee Meadows Reach

Levees and Floodwalls. Both short- and long-term effects to the fishery resources would be

associated with construction of floodwalls and levees along the north and south banks of the Truckee River from Highway 395 to Vista. Most of the flood risk management features proposed for the Truckee Meadows reach under the Floodplain Terrace Plan would be set back from the stream bank. Therefore, for these setback features no short-term adverse effects to the fishery resources would be expected with implementation of BMPs to control soil erosion and toxic spill potential.

Where structures or topography do not allow sufficient space to construct floodwalls away from the stream bank, direct and indirect effects to fishery resources would result from construction of in-channel floodwalls. Work in the river channel could result in direct injury and/or mortality to fish and disturbance to fisheries habitat. Excavation and fill would be required as a part of in-channel floodwall construction, which would increase fine sediment input. Fish and aquatic invertebrate assemblages could be indirectly affected by increased erosion, sedimentation, and water turbidity during construction within the channel. Excessive sediment quantities deposited in stream channels can degrade aquatic habitat. An increase of 10 NTUs above natural conditions would exceed the NDEP water quality standard. Sediments can smother developing eggs, degrade spawning and rearing habitat, and decrease food production. Increased turbidity could result in increased fish mortality, reduced feeding opportunities, and could cause fish to avoid biologically important habitat. A substantial reduction in the quality and quantity of important aquatic habitat, or access to such habitat for fish species, is considered a significant effect.

Fish could be adversely affected by exposure to toxic construction materials associated with in-channel floodwall construction. Increased pollutant concentrations could limit fish production, abundance, and distribution by reducing fish egg survival and causing direct mortality of fish. Incubating fry would be at greatest risk due to their limited mobility and the physiological kinetics of toxicant metabolism.

To reduce these construction-related effects to a less than significant level, erosion control and spill prevention plans would be developed and BMPs implemented, as discussed in section 5.4 Water Quality.

The removal of approximately 2 acres of riparian vegetation to construct in-channel floodwalls could also increase erosion and sedimentation, and elevate water temperature. Riparian vegetation generally includes the woody vegetation and cover structures associated with stream banks that function to provide shade; sediment, nutrient, and chemical regulation; stream bank stability; and input of woody debris and leaves that provide cover and serve as substrates for food-producing invertebrates. Most of the riparian habitat function within the construction footprint of in-channel floodwalls is provided by relatively young, narrow willow stands adjacent to the channel and a small number of mature cottonwood stands. However, any short-term increase in water temperature resulting from loss of riparian vegetation is considered a significant effect due to potential adverse effects on trout populations and juvenile fish.

While the increase in water temperature from construction-related activities could represent a significant short-term effect to fisheries, it is important to note that native fish species such as the Lahontan cutthroat trout and cui-ui have adapted to highly variable temperature regimes that are typical for their native habitat range. Lahontan Cutthroat trout are noted for their ability to live in Nevada streams and can survive in water where temperatures exceed 27 degrees Celsius for short periods and prolonged exposure to 25 degree Celsius temperatures. In addition, most native fish move in rivers as flows and prey availability changes, and will likely move to more preferable areas in response to local conditions. Trout in general move to cooler pools and deeper waters during daylights hours, when temperatures can increase to threshold levels.

Regarding temperature changes in the river potentially resulting from reduced shading caused by vegetation removal, it is unclear of the magnitude of effect from project activities. Current shading

provided by the existing vegetation occurs only along the marginal areas of the river for limited periods during the day. The relative shaded area compared to the overall "wetted" area of the river is small and may not significantly affect the overall water temperatures of the river. However, there may be small localized pools that may benefit from the shoreline shading, resulting in some change of habitat quality. During PED phase, further analysis of existing conditions can identify any specific areas of particular concern. Project implementation may be adapted to avoid these particular areas, as discussed in section 5.6.3., below.

Long-term adverse effects would be associated with all levee and floodwall features throughout the Truckee Meadows reach. While revegetation of disturbed sites would be implemented immediately following construction, it would take several years for the riparian vegetation to reestablish itself within the current riparian zone. Slight increases in water temperature may occur until full reestablishment of near shore woody vegetation is reached. Any increase in water temperature resulting from loss of riparian vegetation is considered a significant effect due to potential adverse effects on trout populations and juvenile fish. However, as presented in the Floodplain Terraces discussion below, proposed revegetation of the floodplain terraces following construction would represent a net increase in riparian habitat and near-shore woody vegetation. Therefore, long-term effects to water temperature would not be considered significant.

Levee and floodwall features proposed under this alternative could act as barriers to fish, stranding them after flood waters recede. However, this is not considered to be a significant effect because fish could only be stranded after events greater than the designed-for flood capacity. Currently, fish can become stranded in various reaches during less than the 50-year event. Moreover, the slope of levees would ensure that fish could leave these areas as water gradually drains out of them. Any channels constructed to allow for wetland or marsh establishment would follow a typical dendritic pattern, which would also allow fish to leave as waters recede.

Scour Protection. Scour protection features would place rock revetment into approximately 3.7 acres of Open Water/Pond/Riverine habitat and affect approximately 4.6 acres of riparian habitat. As discussed above for in-channel floodwall construction, erosion, sedimentation, and elevated water temperature could result from the removal of riparian vegetation associated with scour protection construction, indirectly affecting fisheries. Implimentation of appropriate design and construction considerations for scour protection features would minimize long-term effects on aquatic habitat. Bioengineered bank stabilization methods would allow for habitat attributes to be recovered by replanting near shore woody vegetation within the scour protection features. This vegetation would provide instream and overhanging cover, introduce roots and other woody material into the river system, and assist in varying the near shore water velocities and depths. Any increase in water temperature resulting from loss of riparian vegetation is considered a significant effect due to potential adverse effects on trout populations and juvenile fish. However, as presented in the Floodplain Terraces discussion below, proposed revegetation of the floodplain terraces following construction would represent a net increase in riparian habitat and near-shore woody vegetation. Therefore, long-term effects to water temperature would not be considered significant.

Fish could be adversely affected by exposure to toxic construction materials associated with in-channel scour protection construction. Increased pollutant concentrations could limit fish production, abundance, and distribution by reducing fish egg survival and causing direct mortality of fish. Incubating fry would be at greatest risk due to their limited mobility and the physiological kinetics of toxicant metabolism. However, appropriate BMPs would reduce the risk of a hazardous material spill to less than significant.

North Truckee Drain Containment. Some localized, and short- and long-term effects to the

fishery resources would be associated with the placement of the North Truckee Drain into concrete box culverts. Heavy equipment operating in and around the river would have a direct adverse affect on fish habitat. As most of the in-channel work would occur during low flows (i.e., after July 1), the greatest potential for direct effects would be for the fall-spawning fish (i.e., brown trout and mountain whitefish). These fish are considered important game fish of the Truckee River. However, with the localized aquatic footprint and temporary disturbances associated with demolition and reconstruction activities, any direct effects to the growth, survival, or reproductive success of substantial populations of important commercial or game fish species would be considered less than significant.

An indirect effect to fisheries resulting from North Truckee Drain culverts construction activities would be deposition of suspended material downstream that could cover spawning grounds of native and non-native fish species, as well as reduce benthic macroinvertebrate (a food source for fish) species diversity and abundance. Also, there would be direct disturbances to and dewatering of spawning areas associated with new exit channel construction. Continued disturbance from noise, lights, and motion may be enough to cause fish to abandon spawning activities in the vicinity of the construction footprint. However, these disturbances are expected to be localized and temporary. Expected increases in turbidity and suspended sediment associated with work activities would be considered less than significant with the installation of silt curtains and implementation of BMPs.

Materials associated with concrete box culvert construction (e.g., concrete, sealants, and fuel and oil from construction equipment) could adversely affect water quality if accidental spills occur. Increased pollutant concentrations could limit fish production, abundance, and distribution by reducing fish egg survival and causing direct mortality of fish. Incubating fry would be at greatest risk due to their limited mobility and the physiological kinetics of toxicant metabolism. However, appropriate BMPs would reduce the risk of a hazardous material spill to less than significant.

Floodplain Terraces. The excavation of approximately 1.7 miles of floodplain terraces along the south bank of the Truckee River from Greg Street downstream to East McCarran Boulevard involves a land area of approximately 60 acres. Increased flood-carrying capacity from terracing would serve to slightly reduce the total lineal feet of levee and floodwall sections proposed along the north bank of the Truckee River from Glendale Avenue and Vista, as well as those proposed along the south bank from Highway 395 to East McCarran Boulevard.

Floodplain terracing as a flood risk management feature would result in short- and long-term effects to the fishery resources. Fish could be indirectly affected by increased erosion, sedimentation, and water turbidity during in-channel excavation and construction activities. The potential spill of hazardous materials (i.e., oil, grease, gasoline, and solvent) during grading and contouring activities could have indirect effects on all life stages of fish. Operation of construction equipment in or adjacent to the river would increase the risk of a spill of hazardous materials into the river and potentially harm fish habitat. A substantial reduction in the quality and quantity of important aquatic habitat, or access to such habitat for fish species, is considered a significant effect. To reduce this effect to a less than significant level, sedimentation and erosion control plans would be developed and implemented. In addition, appropriate BMPs would reduce the risk of a hazardous material spill to less than significant. Long-term benefits to the fishery resources are expected as floodplain terracing would allow for a suitable surface for riparian revegetation activities.

In the long term, as discussed in Section 5.5 Vegetation and Wildlife, revegetation of the floodplain terraces would expose approximately 48 acres of Willow/Mixed Willow Scrub habitat and 12 acres of Native Riparian Forest habitat to more frequent seasonal inundation. This improved connection between the river and the floodplain would benefit the abundance, distribution, and condition of riparian vegetation in this reach. Increased shading as a result of the improved condition of the riparian vegetation

would help decrease water temperatures. Increased connectivity to the floodplain would help improve water quality by removing fine sediments and nutrients. Greater floodplain connectivity would also provide input of woody debris and leaves that provide cover and serve as substrates for food-producing invertebrates.

Lower Truckee River Reach

Construction of flood risk management features in the Truckee Meadows reach, particularly in-channel construction activities, could increase the amount of suspended solids in the water column that would travel downstream to the Lower Truckee River reach. Deposition of suspended material downstream from construction activities would represent an indirect effect to fisheries habitat and could cover spawning grounds of fish species, as well as reduce benthic macroinvertebrate (a food source for fish) species diversity and abundance.

In addition, potential accidental spills of hazardous materials into the Truckee River during construction of features in the Truckee Meadows reach could affect fisheries in the Lower Truckee River reach. Increased pollutant concentrations could limit fish production, abundance, and distribution by reducing fish egg survival and causing direct mortality of fish. Incubating fry would be at greatest risk due to their limited mobility and the physiological kinetics of toxicant metabolism. However, appropriate BMPs would reduce the risk of a hazardous material spill, making the potential effect on Lower Truckee fisheries less than significant.

Construction of flood risk management features in the Truckee Meadows reach would result in loss of near-shore woody vegetation and other riparian vegetation. Loss of this vegetation would have a direct effect on water temperature conditions in the Truckee Meadows reach, and to a lesser degree, indirectly effect water temperature conditions in the Lower Truckee River reach. Any increase in water temperature resulting from loss of riparian vegetation is considered a significant effect due to potential adverse effects on trout populations and juvenile fish. However, with implementation of environmentally sustainable measures, such as revegetation of floodplain terraces with native riparian vegetation and bioengineering techniques within scour protection features, long-term effects to water temperature conditions in the Truckee Meadows reach would be less than significant, as would indirect effects in the Lower Truckee River reach.

Alternative 2-Detention Plan

The implementation of the Detention Plan is expected to have both adverse and beneficial effects on fishery resources.

Truckee Meadows Reach

The flood risk management features proposed for the Truckee Meadows Reach under the Detention Plan would be similar to those for the Floodplain Terrace Plan except for the proposed work on the North Truckee Drain and the construction and operation of two detention basins. For this plan, habitat mitigation is proposed for loss of riparian habitat, as discussed in Section 5.5 Vegetation and Wildlife. This mitigation would perform the same function as revegetation of the floodplain terraces in the environmentally sustainable design approach in the Floodplain Terrace Plan . The construction methods and resulting effects and significance on fishery resources would also be similar for both alternatives with the exception of the additional work proposed under the Detention Plan . The potential effects resulting from the additional features are assessed below.

Construct Detention Basins. Two detention basins would be constructed; one off-stream at UNR Farms and one on-stream along Steamboat Creek at Huffaker Hills (approximately 5 miles upstream of

the main stem of the Truckee River). The detention basins would temporarily store peak flows in the Truckee Meadows and spread the release of flood water downstream from the Truckee Meadows over time so that downstream reaches would not experience significant increases in peak flood volumes over existing conditions.

Detention basin features proposed under this alternative could act as barriers to fish, stranding them after flood waters recede. However, this is not considered to be a significant effect because fish could only be stranded after events greater than the designed-for flood capacity. Currently, fish can become stranded in various reaches during less than the 100-year event. Moreover, the slope of the detention basins would ensure that fish could leave these areas as water gradually drains out of them.

North Truckee Drain Realignment. The realignment of the North Truckee Drain would relocate the confluence of the drain with the Truckee River approximately 4,500 feet downstream from its existing outlet. A new concrete exit channel would be constructed at its exit at the Truckee River.

Some localized, and short- and long-term effects to the fishery resources would be associated with the realignment of the North Truckee Drain. Existing outlet demolition and new exit channel construction could result in direct injury and/or mortality to fish. Heavy equipment operating temporarily in and around the river could also damage fish habitat. As most of the in-channel work would occur during low flows (i.e., after July 1), the greatest potential for direct effects would be for the fall-spawning fish (i.e., brown trout and mountain whitefish). These fish are considered important game fish of the Truckee River. However, with the localized aquatic footprint and temporary disturbances associated with demolition and reconstruction activities, any direct effects to the growth, survival, or reproductive success of substantial populations of important commercial or game fish species would be considered less than significant.

Deposition of suspended material downstream from construction activities could cover spawning grounds of these fish, as well as reduce benthic macroinvertebrate (a food source for fish) species diversity and abundance. Also, there would be direct disturbances to and dewatering of spawning areas associated with new exit channel construction. Continued disturbance from noise, lights, and motion may be enough to cause fish to abandon spawning activities in the vicinity of the construction footprint. However, these disturbances are expected to be localized and temporary. Expected increases in turbidity and suspended sediment associated with work activities would be considered less than significant with the installation of silt curtains and implementation of best management practices.

Materials associated with existing outlet demolition and new exit channel construction (e.g., concrete, sealants, and fuel and oil from construction equipment) could adversely affect water quality if accidental spills occur. Increased pollutant concentrations could limit fish production, abundance, and distribution by reducing fish egg survival and causing direct mortality of fish. Incubating fry would be at greatest risk due to their limited mobility and the physiological kinetics of toxicant metabolism. However, appropriate BMP's over and adjacent to aquatic habitat would reduce the risk of a hazardous material spill to less than significant.

Lower Truckee River Reach

Indirect effects to fisheries in the Lower Truckee River reach resulting from construction of the Detention Plan features in the Truckee Meadows reach would be similar to effects under the Floodplain Terrace Plan . As discussed for the Floodplain Terrace Plan , any direct or indirect effects to the growth, survival, or reproductive success of substantial populations of important commercial or game fish species would be less than significant.

5.6.3 Mitigation Measures

As discussed earlier, in recommending mitigation for adverse effects, sequential mitigation steps recommended in the CEQ's NEPA regulations (40 CFR §1508.20 (a-e) are followed. These mitigation steps (in order of preference) are: a) avoidance of effect; b) minimization of effect; c) rectification of effect; d) reducing or eliminating the effect over time; and e) compensating for the effect.

The measures listed below to avoid and minimize effects to fisheries include recommendations provided by USFWS in the draft CAR (Appendix B to the draft EIS). However, the draft CAR was prepared using a preferred alternative no longer being considered by the USACE because additional analysis subsequently determined that the alternative did not meet Federal economic criteria. The USACE and local sponsor have since developed a feasible preferred alternative focusing on flood risk management and recreation features in the Truckee Meadows project area. Ecosystem restoration and fish passage features included as part of the previous alternative are no longer included in the new preferred alternative. As a result, some of USFWS's recommendations related to fisheries no longer apply and would not be implemented. Section 7.4 has been revised to provide additional details about those recommendations that would not be implemented.

Measures that would be implemented for all action alternatives include:

1. Construction activities immediately in and adjacent to the river channel would be done during low flows (i.e., between July 1 and September 30) while maintaining downstream water flow. De-watering associated with construction would not occur during the spring season to avoid migration periods of native fish (especially federally listed fish species). Personnel and equipment would be on-hand to conduct fish rescues if needed, placing fish outside areas of construction. Fish salvage operations would be coordinated with USFWS and NDOW at least 24 hours prior to implementation.

2. Excavation within the stream channel would be limited to the extent possible. If all the excavated material is not relocated to another portion of the project area, it would be completely removed from the floodplain so it does not reenter the river during the next high flow event. These materials would be located on previously disturbed upland areas to the extent possible.

3. Erosion control and maintenance measures would be implemented on a site-specific basis. Pertinent materials would be certified weed-free. Hydromulch would be secured with an organic tackifier.

4. Excess spoil materials would be properly stored. Measures would be implemented to ensure that spoil material does not enter the Truckee River, Steamboat Creek, or adjacent wetlands.

5. A spill prevention and containment countermeasure plan that addresses all potential mechanisms of contamination would be developed. Suitable containment materials would be on-hand in the event of a spill. All discarded material and any accidental spills would be removed and disposed of at approved sites.

6. Instream time and the number of stream crossings for heavy equipment would be minimized to the extent possible. Stream crossings would be perpendicular to the stream and in designated areas using gently sloping and stable banks.

7. Equipment and vehicles operated within the floodway would be checked and maintained daily to prevent leaks of fuels, lubricants, and other fluids to the river.

8. Temporary roads would be constructed to the minimal number, width, and total length consistent with construction activities. Roads would be minimized in sensitive areas (e.g., riparian). Water bars and other erosional controls would be installed for permanent roads or trails.

9. Coordination efforts with USFWS, NDOW and the PLPT would continue throughout the preconstruction engineering and design phase with emphasis on features directly affecting fish and wildlife resources.

10. Measures for monitoring and associated adaptive management would be implemented to verify the performance of mitigation, construction BMPs, and other conservation features. Lessons learned from the earlier phases of construction would be applied to later phases.

11. Alternatives that include the use of surface water would implement measures that minimize fish entrainment and water consumption.

12. USACE would use biotechnical bank stabilization methods to the extent possible in areas adjacent to the Truckee River and Steamboat Creek.

13. Prior to revegetation efforts, invasive perennials such as whitetop species would be treated with herbicide prior to any revegetation efforts. For revegetation areas adjacent to the river and wetlands, perennial invasive species would be hand-pulled. Re-growth would be treated with weed herbicide using a wick applicator.

Rectification of effects to fisheries resources would be accomplished primarily by restoring temporarily disturbed areas to pre-project conditions following completion of construction. This would include ground decompaction, recontouring, and reseeding of disturbed sites. Reducing the effect over time and compensation of high value habitat lost are discussed below for each action alternative.

Alternative 3-Floodplain Terrace Plan

In order to avoid or minimize short-term effects to water temperature resulting from temporary loss of riparian shading, the following measures would be implemented:

- Project construction would be phased over a 5 year period to allow for transitional effects to the overall project area, so that only a portion of the riparian shading would be lost per year. During each successive year, riparian plantings would mature over the course of the project.
- Consider planting some mature trees in critical areas to attain short-term benefits while younger riparian vegetation matures.
- Water temperatures would be monitored during the first year of construction and adapt short-term mitigation efforts for successive years based on changes measured.

The environmentally sustainable design approach, including revegetation of floodplain terraces and incorporating bioengineered techniques in scour protection measures to the extent practicable, would minimize long term effects to fisheries resources in this reach; therefore, no habitat mitigation is proposed.

Alternative 2-Detention Plan

The Mitigation Measures identified in Section 5.5 Vegetation and Wildlife for this alternative also provides mitigation for effects to fisheries resources under this alternative.

Habitat mitigation proposed for this alternative in the Truckee Meadows reach would be designed to benefit fisheries resources, primarily by creating more near shore riparian habitat that would increase shade and structure along the river and stream channels, contributing to lower water temperatures and refugia. Establishment of emergent wetland/marsh areas would also contribute to water quality through natural filtration of stormwater runoff and tributary inflow to the river.

5.7 SPECIAL-STATUS SPECIES

5.7.1 Affected Environment

This section addresses special-status plant and wildlife species with the potential to occur in the project and project area. For the purposes of this EIS, the term "special-status species" includes species Federally listed and proposed for listing as threatened or endangered, candidate, Nevada State protected species, and Bureau of Land Management (BLM) sensitive species. Special-status species are plant, wildlife, and fish species that are protected by the following regulations and policies:

- Listed or proposed for listing as threatened or endangered under the Federal Endangered Species Act (ESA) (50 C.F.R. § 17.11 [listed animals], 50 C.F.R. § 17.12 [listed plants], and various notices in the Federal Register for proposed species);
- Candidates for possible future listing as threatened or endangered under the ESA (58 FR 188: 51144-51190, September 30, 19930;
- Species protected in Nevada (wildlife: NRS 501.100 – 503.104; and plants: NRS 527.050 and NRS 527.260 – 527.300); and
- Nevada BLM sensitive species (BLM Manual 6840).

Regulatory Setting

The following laws, ordinances, and regulations are applicable or potentially applicable to the project in the context of special-status species:

Endangered Species Act of 1973 (16 U.S.C. § 1531 et. seq.)

The ESA includes provisions for protection and management of species that are Federally listed as threatened or endangered and designated critical habitat for these species[8]. The ESA defines "take" and generally prohibits the "taking" of a species that is listed as endangered or threatened (16 U.S.C. § 1538,). Under the ESA, the "take" of a Federally listed species is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Such acts may include significant habitat modifications or degradation when it "harms" wildlife by impairing essential behavioral patterns, including breeding, feeding, or sheltering. Section 7 of the ESA (16 U.S.C. § 1536) requires Federal agencies, in consultation with the Secretary of the Interior, to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of designated critical habitat for these species.

The USFWS is the administering agency for this authority regarding non-marine species. A

[8] The ESA defines "species" to include any species, subspecies of fish, wildlife, or plant, and any distinct population segment of any vertebrate fish or wildlife species which interbreeds when mature. "Endangered species" are defined as "any species which is in danger of extinction throughout all or a significant portion of its range." "Threatened species" are defined as "any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." (16 USC §1532).

biological assessment, including the potential effects from the proposed project, will be submitted to the USFWS within 180 calendar days of receipt of the most recent species list obtained from the USFWS. Following the review of the information in this EIS, the biological assessment, and information from other sources, the USFWS will issue a formal biological opinion including a determination of jeopardy or non-jeopardy for each species potentially affected by the proposed project. If the biological opinion includes one or more findings of jeopardy to the continued existence of a species, the USFWS would identify reasonable and prudent measures to avoid jeopardy. Based on this information, appropriate mitigation measures would be developed with the USFWS by USACE and TRFMA.

Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668 – 668d)

The Bald and Golden Eagle Protection Act provides for the protection of the bald eagle and the golden eagle by prohibiting the take, possession, sale, purchase, barter, offer to sell, purchase or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit (16 USC § 668a, 50 C.F.R. § 22). "Take" includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb (16 USC § 668(c), 50 C.F.R. § 22.3). The USFWS is the administering agency for this authority.

Migratory Bird Treaty Act (16 USC § 703 et. seq.)

This act includes provisions for protection of migratory birds, including basic prohibitions against any taking not authorized by Federal regulation. All wild birds, with the exception of the starling and house sparrow, are covered by the Federal Migratory Bird Treaty Act, and are further protected from shooting or capture by State wildlife regulations (NDCNR, 2007). The administering agency for the Migratory Bird Treaty Act is the USFWS.

Nevada Legislative Authority

The State of Nevada does not have a separate or distinct threatened or endangered species act. However, the protection of biological resources in the State of Nevada is legislatively authorized under the Nevada Revised Statutes (NRS). The NAC contains the rules and regulations developed to implement the statutes.

Under State law, a species may be designated as threatened, endangered, or sensitive. The divisions within the Nevada Department of Conservation and Natural Resources (NDCNR) have primary authority to administer laws and regulations pertaining to fish and wildlife populations in Nevada. State-listed species are "protected" under the authority of NRS 501.100 – 503.104 (wildlife), and NRS 527.050 and NRS 527.260 – 527.300 (plants). Capturing, removing, or destroying plants and animals on the State's fully protected list is prohibited unless a special permit has been obtained from the State Divisions of Forestry and Wildlife. NDOW is responsible for the protection and propagation of native fish populations and sensitive species.

Bureau of Land Management Policies

In Nevada, the BLM Special-status Species consist of USFWS listed, proposed or candidate species, species protected by Nevada State law, and species designated as Sensitive by the Nevada office of the BLM. Nevada BLM Sensitive species are not Federally listed, nor State-listed, but are species for which population viability is a concern. Concern is warranted by a downward trend in population numbers, density, or habitat conditions that would reduce a species' existing distribution. BLM policy is to provide these species with the same level of protection as is provided for candidate species in BLM Manual 6840.06C, that is to "ensure that actions authorized, funded, or carried out do not contribute to the need for the species to become listed."

Area of Analysis and Methodology

The project area is described in Section 2.2 Location of the Project. Special-status species that have the potential to occur in the study and project area were compiled through a review of various sources including:

- Species listed, proposed for listing as threatened or endangered, or candidate species under ESA and identified in the updated species list from the USFWS (File No. 2011-SL-0215), dated May 10, 2011, and included in Appendix E;
- Species protected in Nevada (wildlife: NRS 501.100 – 503.104; and plants: NRS 527.050 and NRS 527.260 – 527.300) and identified in the species list from Nevada Natural Heritage Program (NNHP), dated October 08, 2007 (as amended on November 28, 2007), and included in Appendix E;
- A review of current status information on Sensitive or Watch List species in Nevada whose long-term viability has been identified as a concern, or could qualify as a Sensitive species, by the NNHP;
- Species ranked by NNHP for threats and/or vulnerability based on its distribution within Nevada;
- Species ranked by Nevada Native Plant Society as endangered, threatened, or tracked as a "watch" species;
- A review of BLM Special-status Species, designated Sensitive by the Nevada office of the BLM, whose population viability is of concern;
- A review of biological assessments, field surveys, and environmental documents pertaining to the biological resources of the project area, and;
- A review of literature on species distribution and habitat requirements.

The NNHP collects and disseminates information on the occurrence, distribution, and population status of all threatened, endangered and sensitive flora and fauna in order to identify trends that could result in their becoming either more or less vulnerable. NNHP "ranks" species for threats and/or vulnerability based on its distribution within Nevada at the lowest taxonomic level. The State rank indicators used are:

- Critically imperiled and especially vulnerable to extinction or extirpation due to extreme rarity, imminent threats, or other factors;
- Imperiled due to rarity or other demonstrable factors;
- Rare and local throughout its range, or with very restricted range, and therefore vulnerable to decline;
- Long-term concern, though now apparently secure; usually rare in parts of its range, especially at its periphery, and;
- Demonstrably secure, widespread, and abundant.

The NNHP, working with biologists and resource managers from many organizations, also identifies landscape units that contain assemblages of sensitive species. The Natural Heritage Scorecard reports on particular conservation sites defined by occurrences of sensitive species that are appropriately managed as a unit based on common biological, land-ownership, and conservation-planning criteria. Sites with high diversity, protection urgency, and adaptive management requirements become the highest priority conservation sites. In Scorecard 2006 (NNHP, 2006), 69 Nevada sites ranked as highest priorities. These sites represent the NNHP's highest priorities for conservation of biodiversity because

each contains one or more critically imperiled species.

All special-status species and conservation sites that have the potential to occur in the project area are presented in Table 1 of Appendix E. Federal and state designations, general habitat requirements, and information on each species' potential to occur in the project area (based on its distributional range and available habitat) are also provided in Table 1 of Appendix E.

Potentially Affected Species

Based on a review of the habitat requirements and known distributional ranges of all special-status species that have the potential to occur in the project area, the following special-status species were determined to be absent from the project area: mountain yellow-legged frog, northern goshawk, tri-colored blackbird, ferruginous hawk, Vaux's swift, western least bittern, long-eared myotis, fringed myotis, Steamboat buckwheat, Sierra Valley ivesia, Webber's ivesia, and sand cholla. The mountain yellow-legged frog historically occurred on the slopes of Mount Rose in Washoe County; however, the species is believed to be extirpated from Nevada (68 FR 2283). The northern goshawk and Vaux's swift require higher elevation coniferous forests for foraging and breeding. The tri-colored blackbird is not expected to occur in the project area because of the lack of dense cottonwood-willow forested tracts required for this species. There are no recent (last 25 years) documented occurrences of the ferruginous hawk, western least bittern, long-eared myotis, or fringed myotis within the project area. The Steamboat buckwheat, Sierra Valley ivesia, Webber's ivesia, and sand cholla have specific soil requirements which are not found in the project area.

The remainder of the special-status species and conservation sites known to occur in the project area, or that have the potential to occur in the project area based on the availability of generally suitable habitat, are listed with their occurrence by project reach in Table 5-20. A detailed description of Federally listed species follows Table 5-20. One species that is a candidate for federal listing under the ESA and may occur in or near the proposed project area was identified in the April 8, 2013, species list from the USFWS. This species is the greater sage grouse *(Centrocercus urophassianus)*. In addition, the bald eagle, golden eagle, and migratory birds were considered in this analysis. Each of these species or species groups is discussed in this section.

<u>Lahontan Cutthroat Trout</u>

Status. LCT (*Oncorhynchus clarki henshawi*) was listed by the USFWS in 1970 (35 FR 16047) as endangered. Subsequently, LCT was reclassified as threatened in 1975 in order to facilitate management and allow State regulated angling (40 FR 29863). In 1995, the USFWS released its recovery plan for LCT, encompassing six river basins within the historic range of this subspecies (USFWS, 1995). Critical habitat has not been designated for LCT.

Classification. LCT is an inland subspecies (one of 14 recognized subspecies of cutthroat trout in the Western United States) endemic to the Lahontan basin of northern Nevada, eastern California, and southern Oregon. LCT historically occurred in most cold waters of the Lake Lahontan basin, including: 1) Large alkaline terminal lakes (e.g., Pyramid Lake and Walker Lake); 2) oligotrophic alpine lakes (e.g., Lake Tahoe and Independence Lake), slow meandering low-gradient river (e.g., Humboldt River), moderate gradient montane rivers (e.g., Truckee, Carson, and Walker Rivers), and small headwater tributary streams (e.g., Donner and Prosser Creeks) (USFWS, 2003).

The USFWS recognizes three distinct population segments (DPS) of LCT based upon morphological, meristic, allozyme, and mitochondrial genetic differences. These include: 1) Western Lahontan basin comprised of the Truckee, Carson, and Walker River basins; 2) Northwestern Lahontan basin comprised of the Quinn River, Black Rock Desert, and Coyote Lake basins; and 3) Humboldt River

basin (USFWS, 1995). These DPS designations have been confirmed most recently with data from microsatellite markers and more extensive and systematic sampling of extant LCT populations (Peacock and Kirchoff, 2007). The proposed project area is within the Truckee River basin; therefore, this evaluation is specific to the Truckee River basin portion of the Western Lahontan basin DPS.

Table 5-20. Special-Status Species and NNHP Conservation Sites Known or having the Potential to Occur by Reach in the Project area.

Common Name *Genus species*	Status[1] USFWS/ BLM/ NV/NNPS	Occurrence by Reach	
		Truckee Meadows Reach	Lower Truckee River Reach
Fish			
Cui-ui *Chasmistes cujus*	LE/-- /P/--		Spawning only
Lahontan cutthroat trout *Oncorhynchus clarki henshawi*	LT/-- /P/--	Planted for sport fishery	Planted for sport fishery
Invertebrates			
California floater *Anodonta californiensis*	--/S/--/--	Suitable habitat present	Suitable habitat present
Carson wandering skipper *Pseudocopaeodes eunus obscurus*	LE/S/P/--	Suitable habitat present	Suitable habitat present
Wong Springsnail *Pyrgulopsis wongi*	--/S/--/--	Suitable habitat present	Suitable habitat present
Amphibians			
Northern leopard frog *Rana pipiens*	--/S/--/--	Suitable habitat present	Yes
Reptiles			
Sierra alligator lizard *Elgaria coerulea palmeri*	--/S/--/--	Suitable habitat present	Suitable habitat present
Birds			
Golden Eagle *Aquila chrysaetos*	--/S/P/--	Rare forager	Rare forager
Short-eared owl *Asio flammeus*	--/S/P/--	Suitable habitat present	Suitable habitat present
Burrowing owl *Athene cunicularia hypugaea*	--/S/P/--	Suitable habitat present	Suitable habitat present
Swainson's hawk *Buteo swainsoni*	--/S/P/--	Suitable habitat present	Yes
Greater Sage grouse *Centrocercus urophasianus*	C/S/P/--	Suitable habitat present	Suitable habitat present
Black tern *Chlidonias niger*	--/S/P/--	Suitable habitat present	Suitable habitat present
Yellow Warbler *Dendroica petechia*	--/PS/P/--	Yes	Yes
Merlin *Falco columbarius*	--/S/--/--	May occur as a winter migrant	May occur as a winter migrant
Prairie Falcon *Falco mexicanus*	--/S/P/--		May forage in area
Bald Eagle *Haliaeetus leucocephalus*	D/S/P/--	May occur as a winter migrant	May occur as a winter migrant
Loggerhead Shrike *Lanius ludovicianus*	--/S/P/--	Suitable habitat present	Suitable habitat present
Lewis' woodpecker *Melanerpes lewis*	--/S/P/--		Marginal habitat present
Osprey *Pandion haliaetus*	--/S/P/--	May forage in area	May forage in area

Common Name *Genus species*	Status[1] USFWS/ BLM/ NV/NNPS	Occurrence by Reach	
		Truckee Meadows Reach	Lower Truckee River Reach
White-faced ibis *Plegadis chihi*	--/PS/P/--		Occasional migrant
Vesper sparrow *Pooecetes gramineus*	--/S/P/--	Suitable habitat present	Suitable habitat present
Yellow-billed Cuckoo *Coccyzus americanus*	C/S/P/--	No	Suitable habitat present
Mammals			
Pygmy rabbit *Brachylagus idahoensis*	--/S/P/--	Suitable habitat present	Suitable habitat present
Townsend's big-eared bat *Corynorhinus townsendii*	--/S/P/--	May forage in area	May forage in area
Big brown bat *Eptesicus fuscus*	--/S/--/--	May forage in area	May forage in area
Spotted bat *Euderma maculatum*	--/S/P/--	Yes	May forage in area
River otter *Lontra canadensis*	--/S/P/--	Suitable habitat present	Suitable habitat present
Small-footed myotis *Myotis ciliolabrum*	--/S/--/--	May forage in area	May forage in area
Long-legged myotis *Myotis volans*	--/S/--/--	Suitable habitat present	Suitable habitat present
Yuma myotis *Myotis yumanensis*	--/S/--/--	Suitable habitat present	Suitable habitat present
Brazilian free-tailed bat *Tadarida brasiliensis*	--/S/P/--	Colony roosts under E. McCarran Blvd. bridge	May forage in area
Plants			
Nevada oryctes *Oryctes nevadensis*	--/S/--/--/W		Yes
NNHP Conservation Sites			
Reno Metropolitan Conservation Site	--		
[1]Key to Status: -- = No Listing U.S. Fish and Wildlife Service (USFWS): LE = USFWS Endangered LT = USFWS Threatened C = USFWS Candidate D = Delisted		Bureau of Land Management (BLM): S = Nevada Special-status Species – designated Sensitive by State Office of the BLM PS = Proposed Nevada Special-status Species – designated Proposed Sensitive by State Office of the BLM	Nevada State Protected Species (NV): Fauna:P = Species protected under NRS 501 Nevada Native Plant Society (NNPS): W = Tracked as watch-list species

Sources: Klebenow and Oakleaf, 1988, Ammon and Chisholm, 1998, USBR 2004, Hughes and Whittier 2005, NNHP 2008, USFWS 2011.

Distribution. In the Truckee River basin, LCT historically occupied about 360 miles of suitable stream (fluvial) habitat and 284,000 acres of lake (lacustrine) habitat (Gerstung, 1986a). Lake Tahoe is the source for the Truckee River, which flows into Pyramid Lake. Pyramid Lake is a remnant of pluvial Lake Lahontan which, as a terminal lake, supports a highly alkaline and nitrogen-limited ecosystem. Native LCT populations in Pyramid Lake migrated more than 100 miles up the Truckee River through Lake Tahoe to headwaters in its tributaries to spawn (LaRivers, 1962). The Truckee River drainages

historically provided spawning habitat and undoubtedly formed networked ecosystems that supported all life stages prior to water diversions and introduction of non-native fishes in the 20th century (Western Native Trout Initiative, 2007). However, by 1939, the native Lake Tahoe LCT population was extirpated as a result of damage to spawning tributaries. By 1944, the original Pyramid Lake LCT population was extirpated after losing access to its Truckee River spawning grounds due to Derby diversion dam and other factors (e.g., pollution, commercial harvest, and exotic fish introductions (Gerstung, 1988).

Today, there are no extant fluvial LCT populations native to the Truckee River watershed (Peacock and Kirchoff, 2007). Native fluvial LCT populations have been displaced by competition and predation from introduced brown and brook trout, and from hybridization with rainbow trout stocked for recreational fishing (Western Native Trout Initiative, 2007). Independence Lake (outside the project area) supports the only extant native lacustrine LCT population, but it does not show a strong phylogenetic relationship with Truckee River basin historical samples or any other western basin population (Peacock and Kirchoff, 2007).

Out-of-basin fish believed to have originated from the Truckee River basin have been planted throughout the Truckee River watershed by CDFG, NDOW, USFWS, and the PLPT under experimental conditions for recovery (USFWS, 1995) and as part of the recreational fishery in Nevada (Western Native Trout Initiative, 2007). It is estimated that less than 0.3 percent of lake habitat and about 2.2 percent of stream habitat in the Truckee River basin are currently occupied by self-sustaining LCT. This habitat includes 7 small headwater tributaries with a total of 8 miles that support self-sustaining river populations (Interior & State, 2008). These populations are found in Independence Creek, Pole Creek, Upper Truckee River, Bronco Creek, Hill Creek, and West Fork Gray Creek. The lake populations are found in Pyramid and Independence Lakes. Only Independence Lake has a naturally reproducing population.

Currently, spawning opportunities and permanent rearing habitat for LCT in the lower Truckee River do not exist due to seasonally high water temperatures, unsuitable spawning habitat, high sediment loads, and diversion of water before LCT eggs can hatch and fish migrate back to the lake. Cooperative efforts are ongoing to enhance the lower Truckee River system and improve riparian and riverine habitat. This includes the implementation of a more natural flow regime in support of riparian forests and active restoration in various segments of the river.

Life History. Like most cutthroat trout species, LCT is an obligatory stream spawner, which means that LCT predominantly use tributary streams as spawning sites. Spawning typically occurs from April through July throughout the range of LCT, depending on stream elevation, stream discharge, and water temperature (USFWS, 1995). Fish may exhibit three different strategies depending upon conditions, outmigration as fry, as juveniles, or remaining in the river as residents (Neville-Arsenault, 2003). According to Snyder, dependent upon river flow, trout were rather common throughout the entire course of the Truckee River before the river suffered from anthropogenic effects (Snyder, 1917). Seasonal increases in river flow stimulated mass movement of large trout from lakes; as river flows decreased, large trout were less abundant in various reaches of the river. It is likely that a certain proportion of the hatched lacustrine form of LCT stayed in the tributaries and became acclimated to the local habitats and exhibited life history characteristics more typical of fluvial species (USFWS, 2003).

Habitat. Specific habitat requirements of LCT vary seasonally and with life stage. Generally, fluvial LCT inhabit small streams characterized by cool water, pools in close proximity to cover and velocity breaks, well vegetated and stable stream banks, and relatively silt-free, rocky substrate in riffle-run areas (USFWS, 1995). Fluvial populations of cutthroat trout including LCT appear to be intolerant of competition or predation by non-native salmonids, and rarely coexist with them (Dunham, Rahn, Schroeter, and Breck, 2000; USFWS, 1995).

In contrast, lacustrine LCT have adapted to a wide variety of lake habitats that range from small alpine lakes to large desert waters. Unlike most freshwater fish species, some LCT tolerate alkalinity and total dissolved solid levels as high as 3,000 mg/L and 10,000 mg/L, respectively (Koch et al., 1979). LCT are noted for their ability to live in streams where water temperatures during the summer may exceed 27 °C for short periods and fluctuate as much as 14 to 20 °C daily (Dunham et al., 1999; USFWS, 1995). Although LCT can survive prolonged exposure to temperatures of nearly 25 °C, growth ceases when temperatures exceed 22 to 23 °C (Dickerson and Vinyard, 1999). LCT in the lower Truckee River are likely to avoid this reach as temperatures increase and flows decrease during summer and early fall (July to October).

Management. The recovery plan issued in 1995 by the USFWS identified five conditions contributing to the decline and affecting the potential recovery in the Truckee River basin: (1) reduction and alteration of streamflow and discharge; (2) alteration of stream channels and morphology; (3) degradation of water quality; (4) reduction of Pyramid Lake elevation; and (5) introduction of non-native fish species. Several actions were recommended including: (1) developing an ecosystem plan for the Truckee River basin to determine long-rang options relating to water and other uses in the basin; (2) evaluating lacustrine population viability; and (3) evaluating possible remnant "Pyramid Lake strain" LCT in other waters for transplanting. According to the recovery plan's objectives, LCT may be considered for delisting when management is implemented to sustain identified numbers of self-sustaining viable populations. Habitat should be secured to ensure the benefits of management to allow LCT a 95 percent chance of persisting for 100 years or more. Viable populations are considered to be ones that have been established for five or more years and have three or more age classes of self-sustaining LCT as determined through monitoring. The Truckee river basin targets this objective for existing populations in seven fluvial and two lacustrine systems. In addition, LCT reintroduction should be conducted to establish a minimum of six additional populations. (USFWS, 1995)

In 2003, the Truckee River Recovery Implementation Team[9] developed a short-term action plan for LCT in the Truckee River basin which focuses on gathering information about habitat requirements and implementing demonstration projects and research (Interior & State, 2008). The action plan identifies tasks intended to eliminate or minimize threats that affect LCT in the Truckee River and through continued implementation of this process, ensure the long-term persistence of the species. Major issues include: (1) reduction and alteration of stream flow and discharge; (2) alteration of stream channels and morphology; (3) degradation of water quality; (4) reduction of Pyramid Lake elevation and concentration of chemical components; and (5) introductions of non-native fish species.

A large component of species management in the Truckee River involves hatchery supplementation. In Nevada, LCT are stocked in the Truckee River by the USFWS and NDOW, in cooperation with the PLPT. Since the extirpation of the original Pyramid Lake strain of LCT, the Pyramid Lake fishery has been maintained by a hatchery stocking program currently operated by the Pyramid Lake Paiute Tribal Fishery Program and the USFWS. In Pyramid Lake, the contemporary LCT strain, derived from four strains (Heenan, Walker, Summit and Independence Lakes) (Coleman and Johnson, 1988), has been maintained by hatcheries operated by the PLPT. This strain has developed into a sport fishery in Pyramid Lake that is an important source of revenue for the PLPT. These fish are imprinted to the hatchery rather than to the Truckee River, which means spawning fish are more likely to return to an artificial spawning channel created at Sutcliffe, Nevada (on the west side of Pyramid Lake), than to migrate up the river. The population does not naturally reproduce but rather depends on hatchery propagation for maintenance. These fish have also been used as the source for NDOW's hatchery, which also stocks LCT in various locations on the Truckee River with increased frequency over the years

[9] Composed of representatives from USFWS, USGS Biological Resources Division, U.S. Forest Service, BIA, USBOR, CDFG, PLPT, Trout Unlimited, Otis Bay Consultants, and UNR.

(NDOW 2001, 2002, 2003, 2004, 2005). This has been done concurrent with the State's de-emphasis on stocking of and use of sterile (triploid) rainbow trout in a continued attempt to reduce the hybridization risks between LCT and rainbow trout.

Recent genetic work using microsatellite DNA analysis suggests transplanted LCT populations found in Bettridge and Morrison Creeks in the Pilot Peak mountains along the Utah-Nevada border originated from the Truckee River basin, deemed the "Pilot Peak" strain (Peacock and Kirchoff, 2007). This strain has become the focus of production at the USFWS's Lahontan National Fish Hatchery, which raises and stocks these fish in the Truckee River and other locations. The bulk of the trout stocked in 2005 were LCT, of which 34,333 were Pyramid strain raised at the Mason Valley Hatchery, and 48,046 were Pilot Peak strain raised at the Lahontan National Fish Hatchery. In addition, over 2,000 large LCT (>18 inches) from Pyramid Lake were also stocked as part of the mark-recapture tagging and telemetry studies (Table 5-21). These LCT were found in the river up to 49 days after stocking. Although not originally planned for stocking into the Truckee in 2005, the Pilot Peak strain LCT that were stocked became available after disease testing from the California/Nevada Fish Health Lab returned results indicating some fish tested positive for bacterial kidney disease (*Renibacterium salmoninarum*). As a result, the State of California denied their importation so the Lahontan National Fish Hatchery consulted with NDOW to stock the fish into the Truckee in Nevada. After consultation with the PLPT, their release was approved. Sixty four percent of the Pilot Peak LCT were stocked below the East McCarran Bridge (the lower Truckee) to take advantage of the low fish densities and reduced competition with other salmonids.

Table 5-21. Stocking Summary for LCT Planted in the Truckee River between 1999 and 2005.

Year	Number	Average Size (in)	Number of Adult LCT[1]
1999	86,388	6.1	-
2000	52,927	9.0	-
2001	42,700	1.0	-
2002	0	-	-
2003	3,047	14.3	1,906
2004	53,846	11.3	1,999
2005	84,379	10.9	2,000

[1] Represents adult LCT collected at Marble Bluff Fish Passage Facility and the Pyramid Lake spawning channel at Sutcliff, NV and planted in the Truckee River (Reno area) as part of radio telemetry studies conducted by NDOW. Source (NDOW 2001, 2002, 2003, 2004, 2005)

Cui-ui Sucker

Status. The cui-ui lake sucker (*Chasmistes cujus*) was listed as a Federally endangered species March 11, 1967 (32 FR 4001). In 1992, the USFWS released its updated recovery plan for cui-ui. The second revision of the cui-ui recovery plan provided a quantifiable recovery objective (based upon probabilistic analysis of simulated cui-ui response to various hydrologic conditions) with site-specific tasks which, if implemented, are expected to achieve recovery (i.e., eventual delisting) of cui-ui (USFWS, 1992). Critical habitat has not been designated for this species.

Classification. The cui-ui is one of four lake sucker species of the genus *Chasmistes*. The four recognized species are residents of three distinct drainages: cui-ui in the Truckee River basin of western Nevada; shortnose sucker (*C. brevirostris*) in the Klamath River basin of Oregon and California; June sucker (*C. liorus*) in Utah Lake; and the now extinct Snake River sucker (*C. muriei*) of the upper Snake River in Wyoming (Miller and Smith, 1981). Lake suckers are differentiated from other members of the family Castostomidae by thin lips, the lobes of which are separated and may contain papillae, and by a

large terminal, oblique mouth.

Distribution. Cui-ui occupied ancient Lake Lahontan, which covered much of northwest and west-central Nevada during the Pleistocene and more recently until 5,000 to 10,000 years ago. Climate change lowered the level of Lake Lahontan until only fragmented, remnant waters remained (Pyramid, Winnemucca, Walker, and Honey Lakes). By the beginning of the 20th century, cui-ui were abundant in Pyramid Lake and the adjacent Winnemucca Lake. Cui-ui may have spawned in the lower 40+ miles of the Truckee River. As water diversions from the Truckee River were developed (i.e. Newlands Project), Truckee River inflow to Pyramid Lake diminished substantially. During the 1930's, the elevation of Pyramid Lake dropped rapidly and a large delta formed at the mouth of the Truckee River, making it frequently impassable to the stream-spawning cui-ui. Winnemucca Lake dried up at this time as well. During many years, the entire Truckee River was diverted during critical spawning migrations of cui-ui and during summer months.

Cui-ui are currently restricted to Pyramid Lake and the lower Truckee River (downstream from Derby Dam). Adults use the lower 12 miles of the Truckee River only during the spawning season and only in years in which there is sufficient attraction flow for them to pass above or around the delta at the mouth of the Truckee River (Scoppettone, Wedemeyer, and Coleman, 1986). Most spawners use the 10-mile reach between Marble Bluff and Numana dams. Fish passage improvements were completed by USBOR at Derby Dam in 2003; however, the fish ladder has not been operated successfully since its completion.

Life History. Cui-ui are obligate stream spawners that spawn in the lower Truckee River, but spend most of their life in Pyramid Lake (Scoppettone, Wedemeyer, and Coleman, 1986). They are long-lived species (45 years or more), able to take advantage of the occasional high water years to reproduce (Scoppettone, Rissler, and Butler, 2000). Spawning runs generally begin in April or May, depending on timing of runoff, river access, water turbidity, and water temperature. Currently, cui-ui passage above Marble Bluff Dam is facilitated through a lock system that provides passage over the dam. Entrance to the Truckee River (and the Marble Bluff fish facility) from Pyramid Lake is problematic when lake levels drop below elevation 3,812 feet and a delta is exposed. After successful passage, most spawning activity in the river is restricted between Marble Bluff Dam and Numana Dam. Depending on the passage avenue, some also spawn in the Pyramid Lake Fishway or in the Truckee River downstream from Marble Bluff Dam. While most spawners spend only a few days in the river, some may remain up to 16 days. Spawning runs may continue for 4 to 8 weeks, but most fish migrate during a 1- to 2-week period (Coleman, 1986).

Cui-ui predominantly spawn at night, depositing eggs in gravel dominated substrate, at depths of 0.3-1.5 feet with velocities between 0.75 to2.85 feet/second (Scoppettone, Wedemeyer, Coleman, and Burge, 1983). Fertilized eggs hatch in 1 to 2 weeks, depending upon water temperature, after which yolk-sac larvae remain in the gravel 5 to 10 days prior to emergence (Scoppettone, Wedemeyer, Coleman, and Burge, 1983). The optimum range for larvae is 14.4 to 17.2 °C; survival of newly fertilized eggs decreases markedly in water above 17.2 °C. After the eggs hatch, yolk-sac larvae remain in the gravel *5* to 10 days prior to emergence (Scoppettone, Wedemeyer, Coleman, and Burge, 1983). After emergence, some fry may enter river backwaters and remain there for several weeks; however, a majority is carried by river currents into Pyramid Lake where fry occupy shallow littoral zones.

Management. The management objective of the USFWS, which has the lead responsibility for cui-ui management, is to enhance prospects for cui-ui survival by providing as many opportunities for cui-ui to reproduce as available water resources will allow. To do so, Truckee River discharge into Pyramid Lake must be sufficient to: (1) attract and initiate the spawning run; (2) maintain spawning, incubation, and rearing habitat in the river; and (3) provide for outmigration of adults and larvae

(Buchanan, 1987). In general, the greater the spring discharge (and turbidity), the greater the numbers of cui-ui that enter the river and the higher the survival rate of their larvae (Buchanan and Strekal, 1988).

Recovery efforts for the cui-ui began in 1973 by the USFWS and the PLPT to restore the food and sport fishery. The Marble Bluff Fish Facility, managed by USFWS, was completed to allow migrating cui-ui to bypass the delta (fishway) and Marble Bluff Dam (fish lock). Hatchery propagation also began in 1976 to prevent extinction of the species. The Dave Koch Fish Hatchery is operated and maintained by the PLPT and has produced millions of cui-ui larvae yearly since its inception. The larvae have been released into the lake and Lower Truckee River.

The regulation of water flows in combination with restrictions on the harvest of cui-ui, hatchery programs, and subsequent wet water years, has led to increasing cui-ui numbers (Rood et al., 2003). Fish passage over the Truckee River delta has also improved recently because of rising Pyramid Lake elevations (Interior & State, 2008).

Cui-ui reproduced successfully in 14 of 20 years from 1980 to 1999, a substantial improvement from 1950 to 1979, when cui-ui produced large year classes in only two years (1950 and 1969). Spawning runs in the 1980s ranged from 5,000 to 36,300 fish and averaged 12,470 fish annually. Cui-ui passage during spawning runs in the mid-to-late 1990s is shown in Table 5-22. Record spawning runs were documented between 1996 and 1999, with 585,000 adults in 1999. In 2000, cui-ui numbers dropped to 183,000 spawners. In 1997 and 1998, the USFWS assisted the USGS's Biological Resources Division with a semi-quantitative study to estimate larval cui-ui production upstream of Numana Dam. An estimated 236 million larvae were produced upstream from Numana Dam in 1997, compared to 111.5 million in 1998. A comparison of larval samples taken below Numana and Marble Bluff dams in 1998 gives a very rough estimate of the number of adult cui-ui that spawned successfully above Numana Dam that year. Out of approximately 500,000 adults that passed Marble Bluff Dam, roughly 60,000 passed Numana Dam (Interior & State, 2008).

Table 5-22. Number of Cui-ui Estimated to have Naturally Spawned in the Truckee River between 1994 and 2003.

Year	Number of Spawners
1994	66,000
1995	113,000
1996	192,000
1997	307,000
1998	500,000
1999	585,000
2000	183,000
2001	(No Spawning Run)
2002	40,000
2003	159,000

Carson Wandering Skipper

The Carson wandering skipper is a small butterfly that is Federally listed as endangered. The habitat of the Carson wandering skipper is characterized as grassland habitats on alkaline substrates. These habitats are typified by the presence of saltgrass (*Distichlis spicata*) meadows in proximity to nectar sources in open areas near springs or water. The range of the Carson wandering skipper is restricted to four extant populations occurring within a small geographic range extending from south of Carson City, Nevada, through Washoe County, to southeastern Lassen County, California. No critical habitat has been designated for the Carson wandering skipper. There are locations within the project area

where salt grass is a dominant component of the plant community. However, these locations are unlikely to provide the appropriate habitat needs for the Carson wandering skipper due to their small aerial extent, fragmentation, previous disturbances from agricultural practices, invasions of white top (*Lepidium latifolium*), and Russian thistle (*Salsola kali*), and lack of alkaline soils. The project is not expected to effect the Carson wandering skipper species and is not discussed further.

Yellow-billed Cuckoo

The yellow-billed cuckoo, western U.S. DPS was petitioned for listing on February 9, 1998. A 12-month petition finding published on July 25, 2001 (66 FR 38611), determined that the western populations comprised a Distinct Population Segment (DPS) and placed the species on the candidate list for future action under the Endangered Species Act. The most recent Federal Register citation is the November 10, 2010, annual review (75 FR 69222 69294). The listing priority number is 3, magnitude is High, and immediacy is Imminent. The yellow-billed cuckoo west of the Rocky Mountains is associated with large blocks of multi-story riparian forest. A dense understory and the presence of Fremont cottonwoods and willows appear to be critical factors. The birds apparently require the relatively moist and cool conditions of large (50 to 200+ acres), dense (>50% canopy closure) stands of riparian forest adjacent to water. Fragmentation of suitable habitat limits efforts to recolonize this species (GBBO 2012).

Western yellow-billed cuckoos historically bred throughout riparian systems of western North America, inhabiting the deciduous riparian woodlands adjacent to rivers and streams. Populations declined to remnant levels following 20th century loss, degradation, and fragmentation of riparian habitat from activities including conversion to agriculture, urban development, flood control construction, reservoir inundation, water diversion, livestock grazing, and non-native plant invasion. Habitat loss on wintering grounds may have also contributed to the dramatic population decline. In Nevada, breeding populations are limited to a few locations in southern Nevada. Sightings in western and northeastern Nevada are sporadic and attributed to nomadic non-breeding individuals (GBBO).

Conservation strategies include restoration of Great Basin lowland riparian habitats (including the Truckee River), natural recruitment of cottonwoods and willows, and removing cattle (GBBO 2012), actions conducted by TNC and partners on the lower Truckee River since 2003 and proposed in the current project.

The 1868 study (Ridgeway 1877) recorded the yellow-billed cuckoo as rare. No lower Truckee River detections were documented from 1972 to 1976 from Klebenow and Oakleaf (1984, as cited in USBOR 2008), for 1998 and 2001 - 2003 from the Great Basin Bird Observatory (GBBO) baseline study (GBBO 2006), or from the ongoing (through 2010) annual GBBO surveys on the lower Truckee River, which includes an intensive survey at TNC's McCarran Ranch. Nonetheless, the yellow-billed cuckoo remains on the 2006 priority list of birds used to evaluate the condition of Truckee River riparian areas. Large-scale restoration of contiguous suitable habitat along multiple reaches of the lower Truckee River will be needed before the yellow-billed cuckoo colonizes the lower river, and is regularly detected in surveys, but it is an important goal of TNC's restoration program. The project is not expected to effect the yellow-billed cuckoo species and is not discussed further.

Greater Sage-grouse

The greater sage grouse was placed on the candidate list for future action under the Endangered Species Act following a 12-month status review which was published in the Federal Register (75 FR 13910). The following information is largely excerpted from the 2004 Nevada Department of Wildlife's Greater Sage Grouse Conservation Plan for Nevada and Eastern California (Nevada Department of Wildlife 2004).

Sage grouse occurs throughout the northern two-thirds of Nevada in sagebrush-dominated vegetation communities. Sagebrush and potential sage grouse habitat occurs in the proposed project area, generally on former floodplains where historic riparian vegetation was replaced by sagebrush communities following human-caused changes to the river channel. Sage-grouse are considered a sagebrush ecosystem obligate species. Obligate species are those species that are restricted to certain habitats or to limited conditions during one or more seasons of the year to fulfill their life requirements. Sage-grouse are only found where species of sagebrush exist. Sagebrush species provide nesting, brood, and fall/winter cover as well as forage throughout the year.

Male sage-grouse congregate in late winter through spring on leks to display their breeding plumage and to attract hens for mating. As defined by Connelly et al. (2003), a lek is a traditional display area where two or more male sage-grouse have attended in two or more of the previous five years. The area is normally located in a very open site in or adjacent to sagebrush-dominated habitats. Taller sagebrush on the outskirts of the leks is necessary as a food source, escape cover, nesting cover for females, and loafing cover during the day.

Sage-grouse habitat, when considered over the period of a year, consists of a variety of habitats or habitat conditions over a large area. A mosaic of these habitat types or conditions must be available on the landscape to provide all of the sage-grouse seasonal cover and nutritional needs. Adequate grass and forb cover is an important component to nesting and early brood rearing habitats for both forage and concealment from predators.

The risk factors affecting sage-grouse and sage-grouse habitat include habitat quantity, habitat quality and nutrition, wildfire, habitat fragmentation, livestock grazing, wild and free roaming horses, predation, changing land uses, hunting and poaching, disturbance, disease, pesticides, cycles, and climate/weather. Of these risk factors, habitat quantity, habitat quality, and wildfire have affected Nevada sage-grouse populations the most (Nevada Department of Wildlife 2004).

Habitat quantity has been reduced because of pinyon-juniper encroachment and changes in the plant community from sagebrush to annual grasses due to high severity wildfire. Habitat quality has been reduced due to invasion of exotic annuals and other invasive weed species, improper grazing management systems, and wild horse over-utilization (Nevada Department of Wildlife 2004).

Limited areas of sagebrush occur in the proposed project area. These areas are in historic floodplains that were colonized by sagebrush when the Truckee River became disconnected from the floodplain. Bureau of Land Management records indicate a Population Management Unit north of Interstate-80, but no sage-grouse leks within seven miles of the proposed project area. Project activities are not expected to affect sage grouse populations.

Migratory Birds

Many bird species currently and historically found in the Truckee River are migratory. Comprehensive lists can be found in the GBBO baseline and annual reports (GBBO 2006, 2010, 2011). In general, migratory birds are slowly returning to the restored areas of the Truckee River.

Birds show a greater preference for specific types of riparian habitats than do other wildlife species on the Truckee River (USBOR, 2008) and are an indicator of response to restoration efforts. Riparian corridor width and riparian forest patch size are apparent thresholds for some species. The latter may explain, in part, why the yellow-billed cuckoo has not recolonized the lower Truckee River. The small, narrow patches of riparian forest along the Truckee River, with little to no understory, may also make it easier for brown-headed cowbirds to locate and lay their eggs in the nests of other birds (obligate

brood parasitism). Brown-headed cowbird brood parasitism has the potential to impact populations of the host species (Mayfield 1977, as cited in USBOR, 2008). The abundance of cowbirds has increased sharply in the past 100 years, and they are now common throughout the lower Truckee River (Ridgeway 1877; Lynn et al., 1998). Ten songbird species observed along the lower Truckee River in 1992 and 1993 are frequent or common cowbird hosts (Lynn et al., 1998). Three of these (willow flycatcher, chipping sparrow, rufous-sided towhee) appear to have declined in abundance or disappeared along the river since 1868.

Certain species require large-diameter trees for nesting and/or roosting. Along the Truckee River, sapsuckers, downy woodpeckers, and northern flickers require large cottonwoods in which they excavate their own nest cavity (primary cavity nesters). These species are important because their nest sites are subsequently used by secondary cavity nesters (occupy cavities excavated by another species). Along the Truckee River, native secondary cavity nesters compete with introduced (non-native), secondary cavity nesting species (house sparrow and European starling).

TNC has collaborated with the Great Basin Bird Observatory for a landbird baseline inventory on the lower Truckee River and annual monitoring reports (GBBO 2006). This on-going, intensive study, which began in 1998, is providing valuable information about bird habitat relationships and population trends. GBBO is also providing TNC with focused data for TNC's McCarran Ranch property and other TNC restoration sites, which tracks species recovery trends following restoration projects. Ten species were prioritized for evaluating the condition of lower Truckee River riparian areas. Nine of the species are indicators of improved habitat conditions, each with varying degrees of difficulty to restore and different habitat requirements. Three species (willow flycatcher, yellow-billed cuckoo, and western bluebird) are likely to be detected only when large, connected mosaics of high quality riparian habitat are restored to the lower river.

GBBO used historic data sets, including the 1868 Clarence King expedition (Ridgeway 1877) and the approximate resurvey of Ridgeway's sites in the 1970s by Klebenow and Oakleaf (1984, as cited in USBOR 2008). Birds that experienced the greatest losses during that 100-year period were species whose life history is closely linked to riparian and wetland habitats. For instance, American widgeon, gadwall, western and eared grebes, American bittern, long-billed curlew, American avocet, black-necked stilt, black-chinned hummingbird, marsh wren, common yellowthroat, yellow-breasted chat, and song sparrow were absent in the 1970s after being ranked "common" or "abundant" in 1868 (GBBO 2006).

In a mid-1990s survey, Morrison (1993, as cited in USBOR, 2008) reported 87 species. In 1998, and 2001 to 2003, GBBO recorded 120 species. The more recent surveys detected 75 percent of the 1868 species, but also found new species, many of which are associated with human landscapes and agriculture. However, improvement in flow regimes in the past decade has led to new areas of early successional riparian forest and emergent wetlands, with an apparent genuine response in birds associated with those habitat types. Thus, the majority of species that have begun to recover since the 1970s are linked to habitat changes from supplemental in-stream flows.

The rich historic data sets and current intensive surveys by GBBO provide an unusual opportunity to trace changes to the river environment over time to changes in breeding and migratory bird populations. These studies are valuable to TNC in gaging the effectiveness of restoration projects to overall recovery of riparian-dependent species and species of special concern.

The 2010 GBBO inventory found 79 species, including 45 riparian-associated species, on point counts covering much of the lower Truckee River, and 18 and 20 breeding species at each location (GBBO 2011). The most abundant birds in the point count surveys were species known to be tolerant of disturbance. The results from the past four years have showed relatively little change, possibly because of

a drought that ended in 2010 and the aftereffects of West Nile virus introduction. However, 2010 results included breeding yellow warblers, wood ducks, and common mergansers. The 2009 survey included a breeding season sighting of willow flycatcher at Mustang Ranch (restored that year). Absent from McCarran Ranch prior to restoration, breeding yellow warblers are consistently being detected in recent surveys, a positive indicator of restoration.

The fall migration bird banding in 2009 and 2010 at McCarran Ranch showed similar results, providing documentation that the restored riparian areas provide important stopover areas for about 40 species of birds that migrate to Mexico, Central and South America. The area also appears to provide an altitudinal migration corridor for coniferous birds of the Carson Range.

Bald eagles, except for those that occur in the Sonora Desert in central Arizona, were removed from protection under the Endangered Species Act on August 8, 2007 (72 FR 37346). However, they are still protected under the Bald Eagle and Golden Eagle Protection Act and are listed as a protected species under the Migratory Bird Treaty Act. Bald eagles nest in large trees and on cliffs, often near large water bodies. Winter roosts commonly are large trees and other sheltered sites. Bald eagles feed primarily on fish but will prey on injured waterfowl, various small mammals, and carrion.

In the Great Basin Bird Observatory baseline report for the lower Truckee River (GBBO 2006) bald eagles were considered rare in the historical 1868 survey and were not reported in the more recent surveys documented in the baseline study (1972-1976, 1998, 2001-2005). Bald eagles were not detected in the GBBO's 2007 or 2008 survey, but in the 2009-2010 survey, one bald eagle was sighted on January 10, 2010, and at least one individual was seen or heard incidentally between surveys (GBBO 2010).

Golden eagles were not detected in the 1868 or the 1972-1976 surveys, and were noted as 'rare" in the 1998 and 2001-2003 surveys (GBBO 2006). At least one individual was seen or heard incidentally between surveys as noted in the 2009-2010 report (GBBO 2010). It is possible that a combination of insufficient cliff habitat and prey base exists in the lower Truckee River corridor limits golden eagle use. A high level of human disturbance is also present (Interstate 80 and the railroad) along most of the reach, which could also limit golden eagles.

In their 2010 report, the GBBO discussed fall migration bird banding results from recently restored sites at McCarran Ranch (GBBO 2010). The report points out that the fall migration period highlights the importance of intact lowland riparian habitat for not only the species that use them for nesting, but also their equal or greater significance to species that require them for fuel-up during migration. Species such as yellow-rumped, orange-crowned, and Nashville warblers, Cassin's vireo, and ruby-crowned kinglet, nest in habitats and geographic regions that are long distances away from McCarran Ranch, and they stop over at the ranch for rest and fat accumulation during their journey to Mexico and Central America. Also notably, some of the restoration target species, such as yellow warbler and willow flycatcher are stopping over during their migration from other regions. Their presence during migration is important, because it is generally assumed that this is the time when a bird learns of newly available habitat patches that can be used for nesting once they become suitable.

5.7.2 Environmental Consequences

This section evaluates the effects of the proposed alternatives on special-status species found in the project area. Direct effects occur when special-status species are physically affected by proposed project activities. Indirect effects, both adverse and beneficial, indirectly affect special-status species by human disturbance and changes to hydrology and canopy cover.

Special-status species and conservation sites known to occur in the project area, or that have the

potential to occur in the project area based on the availability of generally suitable habitat, are listed with their occurrence by project reach in Table 5-17.

Significance Criteria

An alternative would be considered to have a significant effect on special-status species if it would result in the take of a Federally or State-listed threatened or endangered species, adversely affect designated critical habitat, or substantially affect any other special-status species, including degradation of its habitat. Effects to Federally listed species are considered adverse if they result in any one of the following:

- Direct mortality.
- Temporary effects to habitats such that the species suffers increased mortality or lowered reproductive success.
- Permanent loss of habitat determined to be critical and/or essential to the species.
- Substantial reductions in the size of a population of the species.

No Action Alternative

Under the No Action Alternative, USACE would not implement the Truckee Meadows Flood Control Project. However, future conditions within the project area would likely experience a continued decline in special-status species' habitat value with associated decline in population numbers. Because many of these species use water as an important component of their life cycle, the quality and quantity of water is important. It is unlikely that water quality would improve with the No Action Alternative.

Truckee Meadows Reach

Without the project, no flood risk management features would be constructed to contain flows in the Truckee Meadows Reach in excess of the current level of protection. Floodwall and levee construction proposed under the action alternatives would not occur. LCT would continue to become stranded in flood-prone areas during less than the 100-year event. Water quality would also decline as a result of continued municipal, industrial, and agricultural uses. Since no additional flood risk management features would be constructed, there would be a continued potential for contaminants to enter the river during high flow events. This is particularly the case in the Truckee Meadows Reach where a large number of industrial areas are located adjacent to the river.

Some of the effects involving riparian vegetation would be somewhat offset by the continued implementation of the prescribed Truckee River ecosystem flow regimes. However, this effect would be difficult to quantify. LCT habitat would continue to degrade, while special-status species populations would also likely decline in numbers because they require habitat features that would likely continue to become degraded and marginalized. LCT populations important to Nevada's recreational fisheries would continue to require supplementation by NDOW and USFWS.

Lower Truckee River Reach

Without the project, The risk of damage due to extreme flood events in the vicinity of Wadsworth would remain, and erosive damages and degraded water quality would continue to occur. Continual degradation in aquatic habitat would be reflected in higher water temperatures, degraded water quality, lack of cover, limited depth/velocity diversity, minimal allochthonous input, substrate embeddedness, sediment-dominated substrates (i.e., fines), and limited microhabitats diversity (e.g., pool-riffle complexes). Warmwater exotic fish taxa such as centrarchids (sunfishes, bass), bullhead, carp, and brown

trout would likely still dominate the Lower Truckee River reach with continued competition and predation on LCT and cui-ui larvae. Spawning opportunities and permanent rearing habitat for LCT in the lower Truckee River would continue to be a limiting factor in recovery efforts.

Special-status species populations would also likely decline in numbers because they require habitat features that would likely continue to become degraded and marginalized. Bird diversity and abundance will continue to decline due to loss of suitable marsh and riparian habitats.

Alternative 3-Floodplain Terrace Plan

The implementation of the Floodplain Terrace Plan is expected to have both adverse and beneficial effects on special-status species. Effects would result from construction and operation of flood risk management proposed under this alternative.

Truckee Meadows Reach

Special status species that have the potential to be affected by this alternative in the Truckee Meadows reach are LCT, migratory birds, and a colony of Mexican free-tailed bats under the East McCarran Boulevard bridge. Cui-ui are currently not present in the Truckee River upstream of Derby Dam. There would be no permanent loss of habitat considered critical or essential to these species.

Lahontan Cutthroat Trout

Levees and Floodwalls. Both short- and long-term effects to LCT would be associated with construction of floodwalls and levees along the north and south banks of the Truckee River from Highway 395 to Vista. Most of the flood risk management features proposed for the Truckee Meadows reach under the Floodplain Terrace Plan would be set back from the stream bank. Therefore, for these setback features no short-term adverse effects to LCT would be expected with implementation of BMPs to control soil erosion and toxic spill potential.

Where structures or topography do not allow sufficient space to construct floodwalls away from the stream bank, direct and indirect effects to LCT and their habitat would result from construction of in-channel floodwalls. Work in the river channel could result in direct injury and/or mortality to fish and disturbance to fisheries habitat. Excavation and fill would be required as a part of in-channel floodwall construction, which would increase fine sediment input. LCT and aquatic invertebrate assemblages could be indirectly affected by increased erosion, sedimentation, and water turbidity during construction within the channel. Excessive sediment quantities deposited in stream channels can degrade aquatic habitat. An increase of 10 NTUs above natural conditions would exceed the NDEP water quality standard. Sediments can smother developing eggs, degrade spawning and rearing habitat, and decrease food production. Increased turbidity could result in increased fish mortality, reduced feeding opportunities, and could cause LCT to avoid biologically important habitat. A substantial reduction in the quality and quantity of important aquatic habitat, or access to such habitat for LCT, is considered a significant effect.

The removal of approximately 2 acres of riparian vegetation to construct in-channel floodwalls could also increase erosion, sedimentation, and elevated water temperature. Riparian vegetation generally includes the woody vegetation and cover structures associated with stream banks that function to provide shade; sediment, nutrient, and chemical regulation; stream bank stability; and input of woody debris and leaves that provide cover and serve as substrates for LCT and food-producing invertebrates. Most of the riparian habitat function within the construction footprint of in-channel floodwalls is provided by relatively young, narrow willow stands adjacent to the channel and a small number of mature cottonwood stands. However, any increase in water temperature resulting from loss of riparian vegetation is considered a significant indirect effect due to potential adverse effects on LCT.

LCT could be adversely affected by exposure to toxic construction materials associated with in-channel floodwall construction. Increased pollutant concentrations could limit fish production, abundance, and distribution by reducing fish egg survival and causing direct mortality of fish. Incubating fry would be at greatest risk due to their limited mobility and the physiological kinetics of toxicant metabolism.

To reduce these construction-related effects to a less than significant level, erosion control and spill prevention plans would be developed and BMPs implemented, as discussed in section 5.4 Water Quality.

Long-term adverse effects would be associated with all levee and floodwall features throughout the Truckee Meadows reach. While revegetation of disturbed sites would be implemented immediately following construction, it would take several years for the riparian vegetation to reestablish itself within the current riparian zone. Slight increases in water temperature may occur until full reestablishment of near shore woody vegetation is reached. Any increase in water temperature resulting from loss of riparian vegetation is considered a significant effect due to potential adverse effects on trout populations and juvenile fish. However, as presented in the Floodplain Terraces discussion below, proposed revegetation of the floodplain terraces following construction would represent a net increase in riparian habitat and near-shore woody vegetation. Therefore, long-term effects to water temperature as it relates to LCT would not be considered significant.

Levee and floodwall features proposed under this alternative could act as barriers to LCT, stranding them after flood waters recede. However, this is not considered to be a significant effect because fish could only be stranded after events greater than the designed-for flood capacity. Currently, LCT can become stranded in various reaches during less than the 50-year event. Moreover, the slope of levees would ensure that LCT could leave these areas as water gradually drains out of them. Any channels constructed to allow for wetland or marsh establishment would follow a typical dendritic pattern, which would also allow fish to leave as waters recede.

Scour Protection. Scour protection features would place rock revetment into approximately 3.7 acres of Open Water/Pond/Riverine habitat and affect approximately 4.6 acres of riparian habitat. As discussed above for in-channel floodwall construction, work in the river channel could result in direct injury and/or mortality to fish and disturbance to fisheries habitat. Excavation and fill would be required as a part of scour protection construction, which would increase fine sediment input. Erosion, sedimentation, and elevated water temperature could result from the removal of riparian vegetation associated with scour protection construction, indirectly affecting LCT.

Implimentation of appropriate design and construction considerations for scour protection features would minimize long-term effects on aquatic habitat. In addition, bioengineered bank stabilization methods would allow for habitat attributes to be recovered by replanting near shore woody vegetation within the scour protection features. This vegetation would provide instream and overhanging cover, introduce roots and other woody material into the river system, and assist in varying the near shore water velocities and depths.

However, any increase in water temperature resulting from loss of riparian vegetation is considered a significant effect due to potential adverse effects on LCT. As presented in the Floodplain Terraces discussion below, proposed revegetation of the floodplain terraces following construction would represent a net increase in riparian habitat and near-shore woody vegetation when compared to current conditions. Therefore, this alternative's long-term effects to water temperature as it relates to LCT would not be considered significant.

LCT could be adversely affected by exposure to toxic construction materials associated with in-channel scour protection construction. Increased pollutant concentrations could limit fish production, abundance, and distribution by reducing fish egg survival and causing direct mortality of fish. Incubating fry would be at greatest risk due to their limited mobility and the physiological kinetics of toxicant metabolism. However, appropriate BMPs would reduce the risk of a hazardous material spill to less than significant.

North Truckee Drain Containment. Some localized, and short- and long-term effects to LCT would be associated with the placement of the North Truckee Drain into concrete box culverts. Heavy equipment operating in and around the river would have a direct adverse affect on LCT habitat. However, with the localized aquatic footprint and temporary disturbances associated with demolition and reconstruction activities, any direct effects to the growth, survival, or reproductive success of substantial populations of LCT or their habitat would be considered less than significant.

An indirect effect to LCT resulting from North Truckee Drain culverts construction activities would be deposition of suspended material downstream that cover spawning grounds of LCT, as well as reduced benthic macroinvertebrate (a food source for fish) species diversity and abundance. Continued disturbance from noise, lights, and motion may be enough to cause LCT to abandon spawning activities in the vicinity of the construction footprint. However, these disturbances are expected to be localized and temporary. Expected increases in turbidity and suspended sediment associated with work activities would be considered less than significant with the installation of silt curtains and implementation of BMPs.

Materials associated with concrete box culvert construction (e.g., concrete, sealants, and fuel and oil from construction equipment) could adversely affect water quality if accidental spills occur. Increased pollutant concentrations could limit fish production, abundance, and distribution by reducing fish egg survival and causing direct mortality of fish. Incubating fry would be at greatest risk due to their limited mobility and the physiological kinetics of toxicant metabolism. However, appropriate BMPs would reduce the risk of a hazardous material spill to less than significant.

Floodplain Terraces. The excavation of approximately 1.7 miles of floodplain terraces along the south bank of the Truckee River from Greg Street downstream to East McCarran Boulevard involves a land area of approximately 60 acres. Increased flood-carrying capacity from terracing would serve to slightly reduce the total lineal feet of levee and floodwall sections proposed along the north bank of the Truckee River from Glendale Avenue and Vista, as well as those proposed along the south bank from Highway 395 to East McCarran Boulevard.

Floodplain terracing as a flood risk management feature would result in short- and long-term effects to LCT. Fish could be indirectly affected by increased erosion, sedimentation, and water turbidity during construction activities. The potential spill of hazardous materials (i.e., oil, grease, gasoline, and solvent) during grading and contouring activities could have indirect effects on all life stages of LCT. Operation of construction equipment adjacent to the river would increase the risk of a spill of hazardous materials into the river and potentially harm LCT habitat.

A substantial reduction in the quality or quantity of habitats in which Federally listed populations occur, or access to such habitat for fish species, is considered a significant effect. To reduce this effect to a less than significant level, sedimentation and erosion control plans would be developed and implemented. In addition, appropriate BMPs would reduce the risk of a hazardous material spill to less than significant. Long-term benefits to LCT are expected as floodplain terracing would allow for a suitable surface for riparian revegetation activities.

In the long term, as discussed in Section 5.5 Vegetation and Wildlife, revegetation of the floodplain terraces would expose approximately 48 acres of Willow/Mixed Willow Scrub habitat and 12 acres of Native Riparian Forest habitat to more frequent seasonal inundation. This improved connection between the river and the floodplain would benefit the abundance, distribution, and condition of riparian vegetation in this reach. Increased shading as a result of the improved condition of the riparian vegetation would help decrease water temperatures. Increased connectivity to the floodplain would help improve water quality by removing fine sediments and nutrients. Greater floodplain connectivity would also provide input of woody debris and leaves that provide cover and serve as substrates for food-producing invertebrates. Long-term benefits to LCT are expected as floodplain terracing would allow for an environmentally sustainable design that incorporates revegetation of riparian habitat, as discussed in Section 5.6 Fisheries.

Migratory Birds

Most of the riparian habitat function within the construction footprint of in-channel floodwalls is provided by relatively young, narrow willow stands adjacent to the channel and a small number of mature cottonwood stands. Activities such as vegetation removal can directly and indirectly affect individuals of sensitive bird species if conducted indiscriminately or at the wrong time of year. Displaced or disturbed birds are expected to return to the area after construction is completed. In the long term, the establishment of 60 acres of riparian habitat on the floodplain terraces would provide additional foraging and nesting habitat in this reach for migratory birds. This alternative would have a short-term, construction related effect on migratory birds that would be less-than-significant with implementation of avoidance and minimization measures discussed in Section 5.7.3 Mitigation Measures, below. Environmentally sustainable designs may provide a long-term beneficial effect with establishment of native riparian habitat along the floodplain terraces.

Golden Eagle and Bald Eagle

Suitable nesting habitat for both bird species is not present in the project area. However, both species may occur as a forager. Effects to bald and golden eagle populations would be less than significant. There would be no permanent loss of habitat considered critical or essential to these species.

Sage Grouse

Some construction effects to suitable habitat for sage grouse may occur during project construction. However, due to the abundance of similar habitats in the immediate vicinity of the project area, the temporary loss of suitable habitat resulting from project implementation is not expected to affect sage grouse populations. There would be no permanent loss of habitat considered critical or essential to this species.

Bats

From June to September of each year, a significant colony of bats reside under the East McCarran Boulevard Bridge. More than 80,000 Brazilian free-tailed bats roost in the bridge's concrete crevices above the Truckee River. Bats may also select buildings or other structures near the Truckee River as their roost. Most species of bats are designated Sensitive by State Office of the BLM and protected under Nevada State law. Construction near the East McCarran Boulevard Bridge and modification or removal of existing buildings along the banks of the Truckee River could lead to temporary direct and indirect effects to habitats such that the species suffers increased mortality or lowered reproductive success. This could be considered a significant effect given the size of the bat colony at the East McCarran Boulevard Bridge and coincidence of their presence with the summer construction schedule. The removal of large trees, especially those with hollows or loose bark, could result in the direct loss of individual bats. Noise and visual disturbances associated with construction activities may disrupt bats roosting in or directly

adjacent to the site. However, displaced or disturbed bats are expected to return following completion of construction and the establishment of 60 acres of riparian habitat on the floodplain terraces would provide additional foraging and roosting habitat in the long term for bat species in this reach. This alternative would have a short-term, construction related effect on bats that would be less-than-significant with implementation of avoidance and minimization measures discussed in Section 5.7.3 Mitigation Measures, below. Environmentally sustainable designs may provide a long-term beneficial effect with establishment of native riparian habitat along the floodplain terraces.

Lower Truckee River Reach

There are no direct effects to migratory birds, bats, sage grouse, or golden and bald eagles anticipated in the Lower Truckee River reach because there are no project features proposed in this reach. Indirect effects to these special status species as a result of induced flows is also expected to be less than significant because of minimal increase in flows for the more frequent flood events, up to the 2% ACE. Direct effects to LCT and cui-ui are also not anticipated in this reach because there are no project features proposed below. Indirect effects to LCT and cui-ui fish species are discussed below.

Lahontan Cutthroat Troat and Cui-ui

LCT abundance within the Lower Truckee River reach decreases in a downstream fashion as a result of degraded water quality conditions. Cui-ui are obligate stream spawners that spawn in the lower Truckee River downstream of Derby Dam beginning April or May, returning to Pyramid Lake after spawning. Indirect effects to these fish species may result from short-term changes to water quality conditions (turbidity, suspended solids) occurring during construction of project features in the Truckee Meadows reach, or long-term changes in water temperature resulting from removal of riparian vegetation and shading.

However, any indirect effects to the growth, survival, or reproductive success of LCT and cui-ui would be less than significant with the timing of construction activities and the implementation of water quality BMPs discussed in Section 5.4 Water Quality and Section 5.5 Vegetation and Wildlife. Implementation of environmentally sustainable designs and bioengineering measures in flood risk management features would reduce the significance of changes in water temperature to less than significant. There would be no permanent loss of habitat considered critical or essential to these species in the Lower Truckee River reach.

Alternative 2-Detention Plan

The implementation of the Detention Plan is expected to have both adverse and beneficial effects on special-status species. Effects would result from the construction and operation of flood risk management, recreation, and hydraulic mitigation features proposed under the alternative.

Truckee Meadows Reach

The flood risk management features proposed for the Truckee Meadows reach under the Detention Plan would be similar to those described for the Floodplain Terrace Plan except for the proposed work on the North Truckee Drain and the construction and operation of two detention basins. The construction methods and resulting effects and significance on special-status species would also be similar for both alternatives with the exception of effects associated with the additional work proposed under the Detention Plan . Those additional effects are assessed below.

Construct Detention Basins. Long-term adverse effects could be associated with operation of the detention basins. Detention basin features proposed under this alternative could act as barriers to LCT, stranding them after flood waters recede. However, this is not considered to be a significant effect

because LCT could only be stranded after events greater than the designed-for flood capacity. Currently, LCT can become stranded in various reaches during less than the 100-year event. Moreover, the slope of the detention basins would ensure that LCT could leave these areas as water gradually drains out of them.

North Truckee Drain Realignment. The realignment of the North Truckee Drain would relocate the confluence of the drain with the Truckee River approximately 4,500 feet downstream from its existing outlet. A new concrete exit channel would be constructed at its exit at the Truckee River. Screening would be incorporated into the design of the exit channel to prevent entrainment of LCT in the canal.

Some localized, and short- and long-term effects to LCT would be associated with the realignment of the North Truckee Drain. Existing outlet demolition and new exit channel construction could result in direct injury and/or mortality to LCT. Heavy equipment temporarily operating in and around the river could also damage LCT habitat. However, with the localized aquatic footprint and temporary disturbances associated with demolition and reconstruction activities, no substantial and/or permanent reduction in the quantity or value of habitats in which Federally listed populations occur would be expected.

Deposition of suspended material downstream from construction activities could cover spawning grounds of these species, as well as reduce benthic macroinvertebrate (a food source for LCT) species diversity and abundance. Also, there would be direct disturbances to and dewatering of aquatic habitat areas associated with new exit channel construction. Continued disturbance from noise, lights, and motion may be enough to cause LCT to abandon the vicinity of the construction footprint. However, these disturbances are expected to be localized and temporary. Expected increases in turbidity and suspended sediment associated with work activities would be considered insignificant with the installation of silt curtains and implementation of best management practices.

Materials associated with existing outlet demolition and new exit channel construction (e.g., concrete, sealants, and fuel and oil from construction equipment) could adversely affect water quality if accidental spills occur. Increased pollutant concentrations could limit LCT production, abundance, and distribution by reducing fish egg survival and causing direct mortality of LCT. However, appropriate best management practices over and adjacent to aquatic habitat would reduce the risk of a hazardous material spill to less than significant.

Lower Truckee River Reach

Indirect effects to special status species in the Lower Truckee River reach resulting from construction of the Detention Plan features in the Truckee Meadows reach would be similar to indirect effects under the Floodplain Terrace Plan. As discussed for the Floodplain Terrace Plan, any direct or indirect effects to the growth, survival, or reproductive success of substantial populations of special status species would be less than significant.

5.7.3 Mitigation Measures

The USACE completed formal consultation with the USFWS regarding potential effects and measures to avoid, minimize, and mitigate for these effects of the project on Federally listed species. In addition, the USACE has been coordinating with NDOW regarding any project effects on State-listed species.

The USACE initiated formal consultation unde Section 7 of the ESA on September 11, 2013. The USACE's determination (based on the biological assessment) was that Alternative 3-Floodplain Terrace Plan is likely to adversely affect the endangered cui-ui (*Chasmistes cujus*) and threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) fish species and no affect on the endangered

Carson wandering skipper (*Pseudocopaeodes eunus obscurus*) butterfly species. Project activities are not expected to affect the candidate yellow-billed cuckoo (*Coccyzus americanus*) and greater sage grouse (*Centrocercus urophasianus*) bird species.

Following review of the information in this EIS, the biological assessment, and information from other agencies and sources, the USFWS provided the USACE with a biological opinion and incidental take statement on December 4, 2013 (included in Appendix E). The USACE will implement all reasonable and prudent measures and terms and conditions in the biological opinion to comply with Endangered Species Act requirements.

The following mitigation measures would be implemented to minimize injury and mortality of juvenile and adult fish for LCT and cui-ui during all in channel work:

1. Equipment would be operated slowly and deliberately to minimize potential injury and mortality of juvenile and adult fish during excavation and placement of fill materials within the active channel. The contractor shall be instructed that before submerging an excavator bucket, or placing fill gravel below the water surface, the excavator bucket or equipment will be operated to "tap" the surface of the water.

2. Dewatering of the existing channel would be conducted slowly and deliberately to prevent the mortality of juvenile or adult LCT or cui-ui.

3. Construction activities immediately in and adjacent to the river channel would be done during low flows (i.e., between July 1 and September 30) while maintaining downstream water flow. De-watering associated with construction would not occur during the spring season to avoid migration periods of native fish (especially federally listed fish species). Personnel and equipment would be on-hand to conduct fish rescues if needed, placing fish outside areas of construction. Fish salvage operations would be coordinated with USFWS and NDOW at least 24 hours prior to implementation.

4. Excavation within the stream channel would be limited to the extent possible. If all the excavated material is not relocated to another portion of the project area, it would be completely removed from the floodplain so it does not reenter the river during the next high flow event. These materials would be located on previously disturbed upland areas to the extent possible.

5. Erosion control and maintenance measures would be implemented on a site-specific basis. Pertinent materials would be certified weed-free. Hydromulch would be secured with an organic tackifier.

6. Excess spoil materials would be properly stored. Measures would be implemented to ensure that spoil material does not enter the Truckee River, Steamboat Creek, or adjacent wetlands.

7. A spill prevention and containment countermeasure plan that addresses all potential mechanisms of contamination would be developed. Suitable containment materials would be on-hand in the event of a spill. All discarded material and any accidental spills would be removed and disposed of at approved sites.

8. Instream time and the number of stream crossings for heavy equipment would be minimized to the extent possible. Stream crossings would be perpendicular to the stream and in designated areas using gently sloping and stable banks.

9. Equipment and vehicles operated within the floodway would be checked and maintained daily to prevent leaks of fuels, lubricants, and other fluids to the river.

10. Temporary roads would be constructed to the minimal number, width, and total length consistent with construction activities. Roads would be minimized in sensitive areas (e.g., riparian). Water bars and other erosional controls would be installed for permanent roads or trails.

11. Coordination efforts with USFWS, NDOW and the PLPT would continue throughout the preconstruction engineering and design phase with emphasis on features directly affecting fish and wildlife resources.

12. Measures for monitoring and associated adaptive management would be implemented to verify the performance of mitigation, construction BMPs, and other conservation features. Lessons learned from the earlier phases of construction would be applied to later phases.

13. Alternatives that include the use of surface water would implement measures that minimize fish entrainment and water consumption.

14. USACE would use biotechnical bank stabilization methods to the extent possible in areas adjacent to the Truckee River and Steamboat Creek.

15. Prior to revegetation efforts, invasive perennials such as whiteop species would be treated with herbicide prior to any revegetation efforts. For revegetation areas adjacent to the river and wetlands, perennial invasive species would be hand-pulled. Re-growth would be treated with weed herbicide using a wick applicator.

The following mitigation measures would be implemented to minimize injury and mortality of migratory birds and sage grouse:

1. Land clearing, burning, and mowing would be conducted outside of the avian breeding season if possible; otherwise, a qualified biologist would survey the area prior to land clearing or mowing. If nests of native, non-invasive species are located or if evidence of nesting of such species is observed, a protective buffer would be delineated and the entire area avoided, preventing the destruction or minimizing disturbance of the nest until the species are no longer active. The size of the protective buffer would depend on the habitat requirements of the particular species.

2. Removal of potential nesting substrate (e.g., trees, shrubs) that may be affected by construction would occur between November 1 and February 28 (i.e., outside the nesting season) to ensure that active nests are not removed as a result of construction activities.

The following mitigation measures would be implemented to minimize injury and mortality of bat species:

1. Any work in the vicinity of the East McCarran Boulevard Bridge should be performed between December 1 and March 31 to minimize the potential for bat colonies to be disturbed as a result of construction activities.

Reducing the effect over time and compensation of high value habitat lost are discussed below for each action alternative.

Alternative 3-Floodplain Terrace Plan

The environmentally sustainable design approach, including revegetation of floodplain terraces and incorporating bioengineered techniques in scour protection measures to the extent practicable, would minimize long term effects to special status species resources; therefore, no mitigation is proposed.

Alternative 2-Detention Plan

The Mitigation Measures identified in Section 5.5 Vegetation and Wildlife and discussed further in Section 5.7 Fisheries for this alternative also provides mitigation for effects to special status species under this alternative.

Truckee Meadows Reach

Habitat mitigation proposed for this alternative in the Truckee Meadows reach would be designed to benefit special status species resources, primarily by creating more near shore riparian habitat that would increase shade and structure along the river and stream channels, contributing to lower water temperatures and refugia. Establishment of emergent wetland/marsh areas would also contribute to water quality through natural filtration of stormwater runoff and tributary inflow to the river.

5.8 LAND USE

5.8.1 Affected Environment

This section discusses land use regulation, local land use designations and zoning, and existing land uses that could potentially be affected by the Truckee Meadows Flood Control Project. The importance of managing land use in the project area is reflected in the regional, county, and local planning documents that define goals, policies, and regulations established to guide the development of the region.

Regulatory Setting

Federal

Executive Order, 11988, Floodplain Management aims to acheive the avoidance, to the extent possible, of long- and short-term adverse effects associated with the occupancy and modification of the base flood plain (1% annual event) and the avoidance of direct and indirect support of development in the base flood plain wherever there is a practicable alternative.

State of Nevada

Chapter 278 of the NRS addresses planning and zoning in the State. The NRS require that a land use plan contain an inventory and classification of types of natural land and existing land cover and uses, and comprehensive plans for the most desirable use of land. Per the NRS, a community design plan requires standards and principles governing the subdivision of land and suggestive patterns for community design and development including constraints. For example, the potential for flooding must be recognized through land use management and flood control improvements.

Regional Plan

Truckee Meadows Regional Plan, 2007

The Truckee Meadows Regional Planning Agency (TMRPA) was created by the State of Nevada to provide comprehensive planning for the entire area within the boundaries of Washoe County except for the Lake Tahoe Basin. All incorporated cities within the County boundaries, except within the Tahoe

Basin, are also subject to the jurisdiction of the TMRPA.

The TMRPA developed and adopted the Truckee Meadows Regional Plan in 1991, with the latest update adopted in 2007. This comprehensive regional plan focuses on coordinating plans of local governments, including Washoe and Storey Counties, the Cities of Reno and Sparks, and other entities in the Truckee Meadows service areas as they relate to land use planning, infrastructure, resource management, and implementation strategies.

The TMRPA is responsible for implementing the Truckee Meadows Regional Plan. The County and City master plans, comprehensive plans, area plans, and specific plans must conform to the goals, policies, and principles established in the regional plan. The regional plan includes goals and policies under four modules for development in southern Washoe County over the next 20 years. These modules are (1) Regional Form and Pattern; (2) Natural Resource Management; (3) Public Services and Facilities; and, (4) Implementation of the Plan (Washoe County, 1996). The plan also defines the spheres of influence (SOI) for the incorporated cities.

County Codes and Plans

Washoe County Code

The Washoe County Development Code is Chapter 110 (Community Development) of the Washoe County Code. This chapter sets regulations regarding development and subdivision of land within the unincorporated area of Washoe County. The code combines zoning and subdivision regulations, ensures conformity of all land development with the Washoe County Comprehensive Plan, and requires adequate public facilities to be available concurrent with the effects of development.

Washoe County Master Plan, 2010

The Washoe County Master Plan is the official master plan for Washoe County. The Master Plan acts as a guide for the Washoe County Board of County Commissioners, the Washoe County Planning Commission, and the community on matters of growth and development. The Master Plan guides growth by establishing and implementing policies and action programs through countywide elements that address countywide issues and concerns, such ashousing, population, conservation, land use and transportation, public services and facilities, and natural resources.

The Master Plan also includes 13 area plans covering each of the County planning areas, as well as a number of specific plans, joint plans, and community plans. The area plans provide more detailed conservation, land use and transportation, public services and facilities information, policies and action programs, and maps related to needs related to each area. The County area plans in the project area include: Verdi, Northwest Truckee Meadows, Southwest Truckee Meadows, Northeast Truckee Meadows, Southeast Truckee Meadows, and Truckee Canyon (Washoe County, 2010b).

Storey County Code

Title 17 of the Storey County Code is entitled Zoning. This title sets regulations regarding uses of land within the unincorporated area of Storey County. The code ensures conformity of all land development with the Storey County Master Plan.

Storey County Master Plan, 1994

The Storey County Master Plan is the official master plan for Storey County. The purpose of the plan is to provide goals and objectives for the development of Storey County. Most of the land developed over the last 40 years in the County has been primarily in the level areas adjacent to Lyon County and

along the riparian zone of the Truckee River. As result, the plan focuses on the development of four primary population areas in the County. The project area for the Truckee Meadows project includes the River District population area (Storey County, 1994).

City Codes and Plans

City of Reno Municipal Code

Title 18 of the City of Reno's Municipal Code is entitled Annexation and Land Use. This title sets regulations regarding annexation and uses of land within the incorporated area of Reno and its SOI as shown in the Truckee Meadows Regional Plan. The code ensures conformity of all development with the Reno Master Plan.

City of Reno Master Plan, 2007

The City of Reno Master Plan, also known as the Great City Plan, is the official master plan for the City and its SOI. The Master Plan acts as a guide for the Reno City Council, Reno Planning Commission, and the community on matters of growth and development. The Plan guides growth by establishing and implementing goals, policies, and action programs through eight citywide plans, including the Land Use Plan (City of Reno, 2008a).

The Master Plan also includes 14 center and corridor plans, as well as 19 neighborhood plans. These plans provide more detailed conservation, land use and transportation, public services and facilities information, policies and action programs, and maps related to the needs related to each area. The center and corridor plan covering the downtown area is the Downtown Reno Regional Center Plan (City of Reno, 2004). Other City neighborhood plans in or near the project area include Newlands, Plumas, Wells, Country Club, and Southeast.

City of Sparks Municipal Code

Title 20 of the City of Sparks Municipal Code is entitled Zoning and Land Use Controls. This title sets regulations regarding zoning and uses of land within the incorporated area of Sparks and its SOI. The code ensures conformity with all development with the City of Sparks Master Plan.

Title 20.47 of the code defines the purpose and permitted uses of the Truckee River Corridor in the city. According to the code, the corridor is "established in order to protect ecological balance and water quality of the Truckee River as well as to preclude the possibility of obstructing the flow of stormwaters."

City of Sparks Master Plan, 2008

Completed in February 2008, the Executive Summary of the City of Sparks Master Plan is a guide to the update of the 1992 official master plan for the City and its SOI. The master plan acts as a guide for the Mayor, City Council, Planning Commission, and community to prepare for and manage orderly growth in Sparks. The Executive Summary currently includes nine categories with accompanying goals and policies. These have been, and will be used, to help develop the Citywide Plan elements: Population Plan (completed), Housing Plan, Conservation Plan, and Public Services and Facilities Plan (City of Sparks, 2008).

Specific and Cooperative Local Planning Area Plans

Downtown Reno Regional Center Plan, 2007

As discussed in the City of Reno Master Plan, downtown Reno is the highest density and

intensity area in northern Nevada. As such, the master plan identifies this area as one of eight regional centers within the city limits. The Downtown Reno Regional Center is generally located south of I-80, west of Wells Avenue, north of California Avenue, and east of Keystone Avenue.

The Downtown Reno Regional Center Plan discusses the need for the plan, development concepts, and policies for the center, and land use and zoning. The plan divides the regional center into five districts: Entertainment District, Truckee River District, California Avenue District, Wells Avenue District, and Keystone Avenue District. The Truckee River District was established to "preserve the Downtown benefits of the Truckee River. Building design and pedestrian corridors which enhance the river corridor are encouraged in this district" (City of Reno, 2007a).

City of Sparks East Truckee River Canyon Area Plan, 2008

The Truckee Meadows Regional Plan identifies the East Truckee River Canyon as a cooperative planning area designated for future annexation by the City of Sparks. As such, the City, in cooperation with Washoe County, is required to update the master plan for this area. Phase I of the update evaluated existing conditions by collecting information and meeting with property owners, interested parties, advisory boards, and local agencies. Phase I resulted in the East Truckee River Canyon Area Plan: Draft Goals and Policies in April 2005.

Phase II, was recently completed and involved studying the future infrastructure needs for the area. These studies included future demands, costs, and key public facilities such as roads, water, wastewater, electricity, and police and fire protection. The final phase will involve integrating these recent studies with the draft area plan. The East Truckee River Canyon Area Plan was expected to be completed by mid-2011 (CFA Planners website).

Other Public and Private Land Plans

Consolidated Resource Management Plan, 2001

The BLM owns sections of the Mustang Ranch and 102 Ranch properties in the Lower Truckee River reach. Since land management authority on Federal land supersedes local land use planning, this BLM planning document governs the land and management policies for these sections of the property. Any development on these sites would be consistent with the management guidelines established for BLM public lands (BLM, 2001).

Indian Reservation and Colony Lands

The Paiute Indian Tribal Council administers the 306,273 acres on the Pyramid Lake Paiute Reservation. The Pyramid Lake Economic Development Plan (2010) sets goals for economic development of tribal lands. The land in the project area is primarily used as grazing land. The PLPT works to conserve natural resources and improve water quality while practicing sustainable grazing practices and working in coordination with resource agencies. In addition, the RSIC owns approximately 28 acres in Reno, including land in the Truckee Meadows reach near Highway 395 and East Second Street and approximately 1,920 acres of land in Hungry Valley. The RSIC's Tribal Council administers the land use in those areas.

Zoning and Land Use

Verdi Reach

Zoning Districts

The Verdi Reach is located within unincorporated areas of Washoe County, which includes the

Verdi community, as well as the limits of the city of Reno. The zoning of an area within the reach is assigned and regulated by the local agency having jurisdiction in that area. According to the Washoe County Master Plan, zoning designations for this area include: General Rural, Open Space, Low Density Suburban, General Commercial, Public and Semi-Public Facilities, Low Density Urban, and Tourist Commercial. According to the City of Reno Master Plan, the land uses in this area are designated as Special Planning Areas, which include the following zoning designations: Planned Unit Development, Specific Plan District, Open Space, or Mixed Use.

Land Uses

Land uses in the Verdi Reach generally consist of rural residential, open space, and undeveloped areas. Land uses associated with the existing fish passage features in the Verdi Reach include the following: at the Fleish diversion, an existing bridge and portions of Old Verdi Road; at the Steamboat diversion, the existing channel; at the Verdi diversion, the existing diversion structure and bypass channel; and at the Washoe diversion, an adjacent mobile home community.

According to the Verdi Area Plan of the Washoe County Master Plan, the official land designations for this area include: Rural, Rural Residential, Suburban Residential, Industrial, and Open Space. As noted above, the City of Reno Master Plan designates land uses in this area as Special Planning Areas, which allow for any individual land use, or land uses in combination, which are compatible and complementary within the project boundaries and with adjoining properties. Near the California-Nevada border at the Fleish diversion dam a small portion of the project area falls within Sierra County, California. The Sierra County land use designation at this location is Forest.

<u>Downtown Reno Reach</u>

Zoning Districts

According to the Downtown Reno Regional Center Plan (part of the City of Reno Master Plan), the entire regional center area has been rezoned to a Mixed Use base zoning district/Downtown Reno Regional Center overlay zoning district.

Land Uses

The Downtown Reno reach, also recognized as the central business district, consists of dense urban development with residential, neighborhood and tourist commercial, and general commercial and industrial areas. There are also some parks, open space, public facilities, and undeveloped areas. The City of Reno is currently redeveloping several blocks of riverfront property in this reach.

Most of the western segment of the reach consists of residential development with some park and undeveloped areas upstream of Keystone Avenue. The most numerous type of housing in this reach is single-family residential. There are also multiple family residential units and mobile home neighborhoods.

Downstream of Keystone Avenue, the land use gradually changes to mainly general and tourist commercial to just downstream of Lake Street. This area includes large hotels and hotel-casinos in the central downtown area where Virginia Street crosses the Truckee River. Typical businesses include retail trade and service-oriented establishments such as the hotels. Most of these establishments are located along Virginia Street and the blocks on the north side of the Truckee River.

The eastern segment of this reach consists of mainly general commercial and industrial with some undeveloped and vacant areas. Industrial land uses include mills, block plants, motor freight transportation facilities, and warehouses.

Truckee Meadows Reach

Zoning Districts

The Truckee Meadows reach includes portions of the cities of Reno and Sparks, as well as unincorporated lands in Washoe and Storey counties. The zoning of an area within the reach is assigned and regulated by the local agency having jurisdiction in that area. Zoning designations for the City of Reno include: Large Lot Residential, Single Family Residential, Mixed Use, Public Facility, Planned Unit Development, Neighborhood Commercial, and Industrial. Zoning designations for the City of Sparks include: Industrial and Public Facility. Zoning designations for Washoe County include: Low Density Residential, Medium Density Residential, High Density Residential, Public/Semi-Public Facilities, Neighborhood Commercial/Office, General Commercial, Industrial, Parks and Recreation, and Open Space.

Land Uses

The Truckee Meadows reach has several distinct land uses that are affected by the current floodplain. The RNO is located in this reach south of the Truckee River. Also included in this reach is the industrial area for the City of Sparks. It also includes commercial and public uses.

According to the City of Reno Master Plan, official land use designations include: Special Planning Area, Unincorporated Transition, Single Family Residential, Mixed Residential, Urban Residential/Commercial, Public Facility, Industrial, and Parks/ Recreation/Open Space. According to the City of Sparks Master Plan, official land use designations include Rural Residential, Tourist Commercial, Industrial, Public Facility, and Open Space/Rural Reserve. According to the Washoe County Master Plan, official land use designations include Rural, Rural Residential, Urban Residential, Suburban Residential, Commercial, and Open Space. According to the Storey County Master Plan, land use designations for the River District include agricultural, recreational, residential, industrial, and commercial development.

Along the north bank in this reach, uses immediately adjacent to the river include public parks, a paved bicycle trail running along the entire length of the north bank up to the Union Pacific Railroad tracks at the Sparks City limit, and undeveloped lands. North of the park land, uses vary from commercial to industrial to public utilities. There is a mobile home park west of Rock Boulevard. However, the majority of the uses in this area are commercial or industrial. Between McCarran Boulevard and the Sparks eastern city limit, the use is almost entirely industrial, with warehouses and storage yards established throughout the area between Greg Street and the river.

Commercial and industrial uses dominate along the North Truckee Drain from the Truckee River north to Prater Way. Much of the drain north of I-80 is adjacent to paved roadways, including Sparks Boulevard to its west. North of Prater Way, the drainage is located between northbound and southbound Sparks Boulevard in predominantly residential areas.

The Grand Sierra Resort and Casino, as well as commercial/industrial uses, are located along the south bank of the river just downstream of Highway 395 to Greg Street. However, other than an industrial/commercial complex along Edison Way, the Sagewinds Drug and Alcohol Rehabilitation Center along McCarran Boulevard, and sporadic buildings associated with the UNR Farms activities, current land use along the south bank up to Steamboat Creek is either agricultural or open space. The TMWRF is located on the east side of the Steamboat Creek confluence.

South of the river and east of McCarran Boulevard, the land use is predominantly rural cropland and includes the land owned and operated by UNR Farms, the majority of which is used as pasture.

South of the UNR Farms land along Steamboat Creek, the area has grown rapidly over the past few years to include residential subdivisions. There is additional pressure to further develop the remaining lands, with the exception of the existing wetlands, into residential subdivisions and associated commercial areas. Residential subdivisions in this area include Hidden Valley, Rosewood Lakes, Donner Springs, and Double Diamond.

UNR Farms. The UNR Farms property is 1,068 acres, of which a major portion has been improved to serve the intensive needs of researchers and as a demonstration facility to meet the instructional requirements of the College of Agriculture. The UNR Farms includes a meat processing plant; an animal health, research, isolation, and surgery unit; experimental and demonstration feed lots; intensive agronomic and horticultural research plot areas; and soil and lysimeter research units.

Steamboat Creek. Residential growth along Steamboat Creek south of UNR Farms has been extremely rapid in recent years. Subdivisions have been constructed on either side of the creek south to Mira Loma Drive. In addition to the Rosewood Lakes golf course, located on the west side of the creek, the Hidden Valley residential community and golf course are located on the east side of the creek. Farther south along Steamboat Creek, residential and recreational development transitions to pastureland and open space between Mira Loma Drive and Alexander Lake Road.

South of Pembroke Drive, Boynton Slough flows into the creek at the Rosewood Lakes Golf Course. Land uses along Boynton Slough are primarily commercial and industrial as the slough flows away from RNO, changing to more residential and recreational uses between East McCarran Boulevard and Steamboat Creek. There are residential developments along Perro Lane between Longley Lane and East McCarran Boulevard.

Along Steamboat Creek south of Bella Vista Ranch Road most of the land currently is designated as Minor Improvements: wells, septic, and outbuildings. Land use generally is pastureland; however, there are gravel mining operations along Bella Vista Road and Desert Way. From approximately South Meadows Parkway south, two subdivisions (Centex I and Centex II) are under construction within the Steamboat Creek floodplain. South of Alexander Lake, there are two existing smaller detention basins that receive drainage from Whites Creek and Thomas Creek**.** South of these existing basins is the Double Diamond residential development area consisting of single-family and townhouse/condominium residences.

Lower Truckee River Reach

Zoning Districts

The Lower Truckee River reach includes parts of Washoe and Storey Counties, as well as the Pyramid Lake Paiute Reservation. The zoning of an area within the reach is assigned and regulated by the local agency having jurisdiction in that area. Zoning designations for Washoe County include: Low Density Residential, Medium Density Residential, High Density Residential, Public/Semi-Public Facilities, Neighborhood Commercial/Office, General Commercial, Industrial, Parks and Recreation, and Open Space. The PLPT administers the land use within the boundaries of the Reservation.

Land Uses

The Lower Truckee River reach includes the rural area of Washoe County north of the Truckee River and Storey County land south of the river. Land use in this reach includes rural residential, agricultural, and limited commercial and industrial uses.

According to the Washoe County Master Plan, official land use designations include: Rural,

Rural Residential, Urban Residential, Suburban Residential, Commercial, and Open Space. According to the Storey County Master Plan, land use designations for the River District include: agricultural, recreation, residential, industrial, and commercial development. The PLPT administers the land use within the boundaries of the Reservation. According to the Pyramid Lake Economic Development Plan, the PLPT includes the communities of Sutcliffe, Wadsworth, and Nixon. Sutcliffe land uses include residential, retail, commercial, and recreational. Wadsworth land uses include residential, retail, commercial, recreational, industrial, and public facilities. Nixon land uses include residential, retail, commercial, and public facilities.

Floodplain associated with the river in this reach is largely constrained by canyon walls and/or I-80 and the Union Pacific Railroad tracks. Downstream of Derby Dam, the floodplain is further limited by the Truckee Canal up to the Pyramid Lake Paiute Reservation just upstream of Wadsworth. Agricultural land uses prevail in this reach. Typical agricultural uses include pasture and grazing lands.

Residential land uses along the Truckee River range from medium density rural to low density suburban. Parcels of land tend to be small, with few greater than 40 acres. Smaller parcels of approximately 20 acres or less with limited river frontages are located near the communities of Lockwood and Wadsworth. Single-family residential units (primarily mobile homes) are the most numerous housing structures in this reach. The desired residential uses in the area focus on maintaining the existing rural atmosphere.

The community of Rainbow Bend, located in Storey County off the I-80 Canyon Road exit, is a small subdivision consisting primarily of single-family mobile home units. West of Rainbow Bend is a small industrial area on the river's south bank. A water treatment facility is immediately east of the community. On the north bank across from the industrial area and west of Canyon Road is an abandoned trailer park. East of Canyon Road is vacant land zoned as industrial.

Around the community of Hafed just downstream of Rainbow Bend and Lockwood, land along the north bank is vacant industrial between the railroad and the river. This use continues downstream to Mustang Road. Assessed as General Commercial, much of the existing land use along the south bank in this area is agricultural, including several residential parcels, and some commercial. From Mustang Road downstream to the community of Patrick, land is primarily vacant and primarily owned by the BLM and/or TNC.

Industrial uses and public utilities predominate along the river between the communities of Patrick and Tracy. Located in this area are various quarry and gravel mining operations, and the Tahoe Reno Industrial Center (TRI), a mixed-use, nonresidential development, consisting of a wide range of industrial, office, and commercial businesses. This 104,000-acre center, located in the community of McCarran, is the U.S.'s largest industrial park and has the capacity of 80 million square feet of industrial space. Companies already at TRI include Mars Petcare Pet Foods, APL Logistics, distributors of Dell Computers, Alcoa, James Hardie, Royal Sierra Extrusions, Golden Gate Petroleum, and others. Also located in the TRI area are three power plants: NV Energy Power, Barrick Mines, and Naniwa (a power plant that provides additional power support during peak hours).

From Tracy downstream to Derby Dam, the land is undeveloped or open space. The Truckee Canal originates from Derby Dam and runs east parallel to the river's south bank. Between the river and the canal are open space and agricultural lands interspersed with single family residences. Similarly, on the north side of the river from Derby Dam to the Pyramid Lake Paiute Reservation, land between I-80 and the river is also characterized by open space and agricultural lands associated with large-lot rural residential parcels.

On the Pyramid Lake Paiute Reservation, from the reservation boundary downstream to the crossing at I-80, land is vacant or used for grazing. From I-80 to the SR 427 crossing, land west of the river is agricultural. An RV campground and Tribal health facilities are located to the east along with detention basins for a fish hatchery. Immediately adjacent to and downstream of State Route (SR) 427, residences are located on either side of the river through the town of Wadsworth. From Wadsworth to Pyramid Lake, land use along the river is primarily agricultural or open space, with scattered residences.

5.8.2 Environmental Consequences

This section identifies and evaluates the potential effect of the proposed alternatives on land use in the project area.

Significance Criteria

Adverse effects on land use were considered significant if implementation of an alternative plan would result in any of the following:

- Conflict with any applicable habitat conservation plan or natural community conservation plan;
- Conflict long-term with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project including, but not limited to, the master plan, area plan, or zoning ordinance;
- Directly or indirectly support development in the base flood plain, per Executive Order 11988; or
- Physically divide an established community.

No Action Alternative

Under this alternative, no Federal action would be taken to alleviate flooding or recreation problems or needs in the project area. Zoning, management of land use, and development in the project area would continue in accordance with the NRS; Truckee Meadows Regional Plan; Washoe and Storey County codes, master plans, and area plans; City of Reno and Sparks codes, master plans, and area plans; and Tribal and Colony administration.

In addition, the Truckee Meadows Flood Control Project assumes that under no action (without-project future conditions):

- Redevelopment of the downtown Reno area will continue; new development will include flood proofing from the FEMA 100-year event.
- Truckee Meadows will develop in areas outside the floodplain. Development closer to the Truckee River will continue to be abated by local ordinances.

Alternative 3-Floodplain Terrace Plan

The Floodplain Terrace Plan would result in some short-term direct and indirect effects to land use during construction. Construction operations, temporary work easements, and staging of equipment and/or spoils would have short-term effects on some park and open space lands, undeveloped lands, or other vacant parcels during construction of the flood risk management features. Negotiation of temporary easements necessary for construction would include fair compensation for loss of use experienced by the landowner during that time period. In addition, construction of project features would be phased by construction contract. Once construction is completed the temporary easement and staging areas would be restored and returned to pre-project conditions and uses. Long-term effects related to flood risk

management features and recreation features for the Floodplain Terrace Plan are described by project reach below.

Truckee Meadows Reach

The primary flood risk management features in the Truckee Meadows reach for the Floodplain Terrace Plan are setback levees, floodwalls, and floodplain terracing. Flowage easements would also be required on lands in between the proposed levees and floodwalls to accommodate the increased depth, duration, and frequency of inundation as part of a new floodway. The flowage easement requirement would be contiguous along both sides of the river from Highway 395 to E. McCarran Boulevard, even along stretches where the levee/floodwall system ties into higher ground. Flowage easements would also be required along the north bank of the river downstream of McCarran Boulevard, but not along the south bank.

Installation of these features would have direct and indirect effects on existing land uses, resulting in the conversion of agricultural, business/commercial/ industrial, and recreation/open space land uses to flood risk management uses. While direct and indirect effects to agriculture and recreation/open space are discussed in more detail in Section 5.9 Agriculture and Prime Farmlands, and Section 5.10 Recreation and Open Space, effects to business/commercial/ industrial land uses are identified below.

Most direct effects to commercial and industrial parcels would result in converting portions of truck trailer and vehicle parking areas into levee and floodwall structures, particularly on businesses and warehouses fronting Coney Island Drive, Spice Island Drive, East Greg Street, and Larkin Circle in Sparks. These easements would not require a change in land use or zoning of the entire parcel, however. An exception would be the business park at North Edison Way, which would be removed to accommodate the proposed floodplain terraces and floodway on the south bank of the river.

Effects to Land Uses on Reno-Sparks Indian Colony Land. East of Highway 395, along the south bank of the river, this alternative calls for approximately 3 acres of levee easement on the northeast side of the Reno-Sparks Indian Colony tribal land. The colony recently completed construction of a Wal Mart Supercenter on the tribal property. As part of an early implementation effort, the TRFMA participated as a cost-sharing partner on the Wal Mart project and were able to incorporate a floodwall into the colony's designs As demonstrated by the Wal Mart project, construction of a levee/floodwall did not meet any of the listed significance criteria for this project and therefore would not have significant direct or indirect effects to the land use of this area. The TRFMA has submitted a request to USACE that the floodwall be considered a feature of the flood project when authorized and that funds they provided for construction of the floodwall be credited toward their cost-sharing obligations of the Federal flood project.

Effects to Land Uses Within Reno City Limits. Features of this alternative that occur within the Reno city limits would be located south of the river between the Reno-Sparks Indian Colony land and E. McCarran Boulevard.

This alternative calls for levee construction along the northern border of the Nevada Department of Corrections Restitution Center immediately east of the Indian Colony land. The levee segment would be a continuation of the levee on the tribal land. In order to provide stand-alone flood protection, the floodwall constructed for the Wal Mart project was extended through the Restitution Center property to Glendale Avenue. Similar to the Indian Colony floodwall segment, the Restitution Center floodwall segment did not require a change in land use designation for this parcel, although compensation for loss of land use along the floodwall easement was negotiated with the State of Nevada. This direct effect to existing land use would be considered less than significant with the purchase of the floodwall easement.

Proposed levees and floodwalls would continue east of Glendale Avenue along the northeast boundary of the Mill Street Transit Oriented Development Corridor (TOD) Plan area where the Grand Sierra Resort RV Park is located. Construction of these flood risk management features would be compatible with the current and proposed land uses for this plan area. Direct and indirect effects to existing and planned land uses would be considered less than significant

Between the Mill Street TOD area and the airport regional center area, on the east side of Greg Street, the floodplain terracing would begin in what is currently 12.5 acres of Parks/Recreation/Open Space, as would a portion of the levee that would parallel Mill Street. As discussed further in section 5.10 Recreation and Open Space, the establishment of a floodway, which would encompass the floodplain terraces and flowage easement, would be compatible with these uses.

Proposed flood risk management features would also be located within approximately 30 acres of the Reno-Tahoe International Airport Regional Center Plan area. Construction of the levees and floodplain terraces and establishment of a floodway would prohibit the development of airport compatible uses identified in the regional center plan within those 30 acres. This represents a less than significant effect on the current land use, which is vacant. Purchase of easements for flood risk management features would compensate for the loss of planned land uses, making long-term effects less than significant.

The levees, floodplain terracing, and flowage easement features also fall within one of this planning area's airport critical zones. The overriding consideration for land uses within these zones are public and aviation safety. The flood project features would be in line with the City's low occupancy land uses requirement for this critical zone and ongoing coordination with the Reno-Tahoe Airport Authority and the Federal Aviation Administration would ensure project features comply with their regulations. Land in this area is currently used for agriculture or is vacant. Aviation safety considerations are discussed further in Section 5.17 Public Health and Safety.

Immediately east of Rock Boulevard and the airport regional center plan, the footprint of this alternative would also cover 129 acres of what is now designated as Industrial land use in the Reno Master Plan. This includes what is currently the North Edison Way business park and agricultural fields on either side of the business park. This Industrial designation extends to McCarran Boulevard. The 14.5 acre Sagewinds property west of McCarran Boulevard is also within the alternative footprint and is designated as Public Facility. Implementation of the flood project would necessitate a change in these land uses to a land use that is compatible with a floodway, such as Parks/Recreation/Open Space. Under this alternative, the business park and Sagewinds facilities would be removed as most of the project recreation features, including the playground, parking lot, medium and large shelters, and restroom, are proposed there. This change in land use designation would be compatible with city and county objectives to provide greater levels of flood protetion to the Truckee Meadows area; therefore, these effects to existing and future land use would be less than significant.

East of McCarran Boulevard, the levee proposed around the UNR Farms Main Station facilities would be located within unincorporated Washoe County, but also within the City of Reno sphere of influence. The County's zoning designation is General Rural and the City has designated this as a Special Planning Area. The levee would be constructed on land currently used for agriculture. Levee construction would not require changing the land use designation for this area, although an easement would be obtained for establishment of the levee. The greater UNR Farms area would continue its current floodway designation under this alternative. Construction of the levee around the UNR Farms Main Station facilities would have a less than significant effect on land use in this area.

Effects to Land Use Within Sparks City Limits. Land uses in the project area within the Sparks city limit occur on the north side of the river from Highway 395 to downstream of Larkin Circle adjacent

to the UPRR tracks.

From Highway 395 to Glendale Avenue, between the river and Galletti Way, flowage easements would be required. The easements would be located on Fisherman's Park and along TMWA's Glendale Diversion water treatment intake facilities. The Sparks land use designation is Public Facility. The proposed flowage easements are not expected to effect the existing land use here.

At Glendale Avenue, an on-bank floodwall is proposed from the bridge downstream to high ground along the northeast edge of the Glendale water treatment settling basin near the end of Byars Lane. On the downstream end of the high point, a levee would be constructed through 4 settling basins of the water treatment facility and tie in to Greg Street. As with project features on the south side of the river, flowage easements would be obtained between the levees/floodwalls and the river. The Glendale Water Treatment Plant is operated by TMWA and used for meeting spring, summer, and fall water system demands in Reno, Sparks, and Washoe County (TMWA 2010). TMWA was consulted during the initial layout of floodwalls and levees for the various plans. While the current alignment indicates effects to some of the treatment plant's settling basins, it is expected that design refinements during detailed design would allow for avoidance of those affects to the plant's capabilities. Coordination with TMWA would continue throughout the detained design and construction phase to ensure no effect to treatment plant capabilities.

Due to the higher elevation on which Rock Boulevard is located between Greg Street and the Rock Boulevard bridge, only flowage easements are proposed across Gateway Park and Rock Park. A flowage easement would also be obtained across the Rivers Edge RV Park between the two city parks. The RV Park parcel is designated Commercial/Industrial and the city parks are designated as Public Facility. Although inundation depth, duration, and frequency would increase on these parcels during high water events, the existing uses would still be considered compatible with a floodway designation for this area. Direct and indirect effects to land use would be less than significant.

Proposed flood risk management features between Rock Boulevard and the river bend downstream of Larkin Circle consists of levees, on-bank floodwall, and in-channel floodwall, depending upon the availability of undeveloped land. Land use between Rock Boulevard and this project area is predominantly designated as Industrial. However, included along this area is a corridor along the Truckee River designated as Public Facility, which includes Glendale Park, Cottonwood Park, and the Truckee River Greenbelt, with the Truckee River Bikeway traversing these locations. Most of this alternative's alignment follows the northern edge of the Public Facility parcels, overlapping into Industrial land uses above the Public Facility areas.

Proposed flood risk management features in this area would affect approximately 130 acres of land designated as Industrial. However, most effects to commercial and industrial parcels would result in converting portions of truck trailer and vehicle parking areas into levee and floodwall structures, particularly on businesses and warehouses fronting Coney Island Drive, Spice Island Drive, East Greg Street, and Larkin Circle in Sparks. These easements would not require a change in land use of the entire parcel. Effects to existing Industrial uses would be less than significant.

Levee, floodwall, and flowage easement features on Public Facility areas would not effect future use of this land, although at Cottonwood Park, the proposed levee footprint would relocate 1,580 feet of Spice Island Drive on top of the new levee. Effects to the greenbelt and parks is discussed further in Section 5.10 Recreation and Open Space.

Summary of Effects on Truckee Meadows Reach Land Use

Establishment of this alternative's flood risk management system in the Truckee Meadows reach through construction of levees, setback levees, floodwalls, floodplain terraces, and a floodway would require a land use change designation in the following locations:

- Approximately 30 acres of Airport Compatible Uses north of Mill Street identified in the Reno-Tahoe International Airport Regional Center Plan, currently being used for agriculture or is vacant.
- Approximately 129 acres of Industrial land use designated in the Reno Master Plan between Rock Boulevard and E. McCarran Boulevard. This includes what is currently the North Edison Way business park and agricultural fields on either side of the business park.
- Approximately 14.5 acres of Public Facility land use designation at Sagewinds property west of McCarran Boulevard.
- The loss of 4 settling basins at TMWA's Glendale Water Treatment Plant.

The remaining flood risk management features would be located on land use designations that are compatible with this alternative's flood performance requirements or would only require an easement along the edge of parcels. Direct and indirect effects to existing and planned land use would be less than significant.

This alternative would not conflict with any existing habitat conservation plan or natural community conservation plan, nor would it physically divide an established community in the Truckee Meadows reach. This alternative would not be expected to divide an established community because all of the communities in the area are already subject to existing limitations on growth and community cohesion as a result of being located in the vicinity of a natural watercourse. Consequently, any changes in land use associated with implementation of this alternative would not likely result in physically dividing an established community.

While this alternative would require changes in land use designations within the proposed flood risk management system, the changes are not anticipated to significantly alter the goals of the affected community plans while addressing the flood risk reduction needs of these communities. Finally, reductions in the base (FEMA's 100-year) floodplain as a result of this alternative occur only in areas that are currently developed, and existing local ordinances strictly regulate further development in the base floodplain. Therefore, this alternative would not directly or indirectly support development in the floodplain.

Overall, the Floodplain Terrace Plan would have a less than signifanct effect on existing and planned use in the Truckee Meadows reach.

<u>Lower Truckee River Reach</u>

In general, this alternative would increase peak flows to the Lower Truckee River reach, potentially indirectly affecting downstream land uses. During the modeled 1% chance event, this alternative would cause a change in Truckee River flows below Vista up to 1,520 cfs, depending on location, relative to modeled baseline conditions. This represents an increase in depth of the 1in 100 chance event floodplain between 0 and 1 foot, depending on topography. This increase would not effect existing structures and facilities. Affected areas include parcels that are either agricultural or have no identified beneficial use. These changes in depth, duration, and frequency of flooding may represent a taking. The most likely takings action would be purchase of a flowage easement on the affected lands by

the non-Federal partner.[10] Changes in land use would not be required for these parcels; therefore, long-term indirect effects to land use would be less-than-significant in this reach.

Alternative 2-Detention Plan

Truckee Meadows Reach

This alternative would have both short-term and long-term effects on land use in this reach that would be similar to those described for the Floodplain Terrace Plan . As discussed for the Floodplain Terrace Plan , temporary work easements, as well as the use of undeveloped and vacant areas for staging during construction, would have short-term effects on their uses. However, once construction is completed, the temporary easement and staging areas would be restored and returned to pre-project conditions and uses. The result of these direct and indirect effects would be less than significant.

Lower Truckee River Reach

Indirect effects to land use for this plan would be similar to indirect effects described for the Floodplain Terrace Plan . Long-term, indirect effects to land use would be less than significant in this reach. There would be no direct effects to the Lower Truckee River reach.

5.8.3 Mitigation Measures

Alternative 3-Floodplain Terrace Plan and Alternative 2-Detention Plan

Mitigation measures to minimize the temporary, short-term effects to land uses include:

- Negotiation of temporary easements necessary for construction would include fair compensation for loss of use experienced by the landowner during that time period.
- Construction of project features would be phased by construction contract.
- Once construction is completed for each contract, the temporary easement and staging areas would be restored and returned to pre-project conditions and uses.

As discussed in Section 5.15 Socioeconomics, TRFMA would be responsible for securing all lands, easements, and rights-of-way necessary for construction and operation of the project. Project lands are typically secured by purchase of fee title, or purchase of easements. The following mitigation measures have been identified to mitigate effects on changes in land use resulting from the construction and installation of flood risk management features:

- Coordination would continue with TMWA to ensure that no water treatment capabilities are lost at the Glendale Water Treatment Facility as a result of this project.
- TRFMA would be responsible for securing all lands, easements, and rights-of-way necessary for construction and operation of the project.
- TRFMA would ensure that all necessary land use designation changes would be implemented as regulated by the responsible local, state, and Federal planning policies.

[10] Takings results from a preliminary takings analysis carried out in 2011 on an earlier iteration of the Floodplain Terrace Plan (1.33% ACE) indicated a taking on approximately 12 parcels in the Lower Truckee River reach. This earlier plan included substantial ecosystem restoration in the Lower Truckee River reach. For purposes of the EIS, when taking into consideration the reduction in induced flows of the current 2% ACE plan and the removal of ecosystem restoration lands, it was estimated that the number of takings would remain approximately the same, although the locations of the takings may change. A revised takings analysis will be carried out on the authorized plan during the detailed design phase of the project.

5.9 AGRICULTURE AND PRIME FARMLANDS

5.9.1 Affected Environment

This section discusses aspects of agriculture that could potentially be affected by the Truckee Meadows Flood Control Project. This includes the regulatory setting, prime farmland, and farming and ranching activities in the project area. Management of agricultural land is included in the regional, county, and local planning documents discussed in Section 5.8 Land Use.

Regulatory Setting

U.S. Department of Agriculture

Because of the loss of agricultural lands due to urbanization, Congress established the Farmland Protection Policy Act (FPPA) contained within the Agriculture and Food Act of 1981. The policy states that all Federal programs must consider protecting three categories of farmland. These include "prime farmland," the highest quality cropland; "unique farmland," land capable of yielding certain high value crops; and “important farmland” as designated by state and local governments, with the consent of the Secretary of Agriculture. The Natural Resources Conservation Service (NRCS) determines which areas are considered prime, unique, and/or important farmland. Nevada does not have any areas designated as unique farmland.

Washoe County

As Washoe County has shifted to a more urban character, the number of people employed in agriculture has declined. Over the past few decades, total employment in Washoe County has steadily increased, while employment in agriculture has declined. The continued role of agriculture in the County economy will depend, to a large extent, on the degree to which farmlands and rangelands are preserved. County policies regarding agricultural land preservation are defined in the Conservation Element of the Washoe County Comprehensive Plan. Applicable County Policies and Action programs relative to agriculture seek to manage the growth of developing areas to protect prime farmlands and lands that should remain open for other considerations.

Active Farms and Prime Farmland

In compliance with NRCS requirements, USACE completed a Farmland Conversion Impact form and submitted it, as well as maps and descriptions of alternatives being evaluated at that time, via letter to the Reno NRCS field office on March 14, 2008. The rating form identified the converted farmland per alternative for the Truckee Meadows project. The NRCS returned their sections of the rating form, as well as maps showing active farms and prime farmland in the project area, via letter dated May 12, 2008.

Truckee Meadows Reach

Most of the potential farmland just north of the river in the Truckee Meadows reach is urbanized and built over with buildings and structures. As such, these soils are not accessible or usable for agriculture. The project area south of the river is less developed with large tracts of land actively used for agriculture. According to the NRCS, the actively farmed areas include (1) five parcels east and west of Rock Boulevard, north of Mill Street, west of East McCarran Boulevard, and south of the river; (2) 33 parcels on and near the UNR Farms east of East McCarran Boulevard, north of a dirt access road, west of Steamboat Creek, and south of the river; and, (3) 11 parcels east of Hombre Way, north of Bella Vista Ranch Road, west of Steamboat Creek, and south of a local drainage ditch near Herons Landing Drive. Most agricultural activities in this reach are associated with the UNR Farms, which provides extension services, conducts research, and operates a commercial meat-packing endeavor for the University.

According to the NRCS, the only designated prime farmland in the reach is 70.1 acres of the actively farmed area between the parcel west of Rock Boulevard and East McCarran Boulevard.

Lower Truckee River Reach

Historically, there were numerous active farms along the Lower Truckee River reach. These farms depended on water from the Truckee River for livestock and irrigation of crops. Since the settlement of Truckee River water litigation, however, many no longer have water rights and are therefore, no longer being actively farmed. Agriculture in this reach primarily consists of livestock grazing. According to the NRCS, the remaining actively farmed areas include (1) 12 parcels on both sides of the river in the Patrick area; (2) 14 parcels scattered along the north side of the river from upstream of Painted Rock to the I-80 crossing; (3) 8 parcels on the west side of the river just downstream from the I-80 crossing; and, (4) 25 parcels on both sides of the river downstream from Wadsworth. Given the economic challenges of sustained active farm cultivation and the shift in water demand from irrigation to municipal and industrial supply within the region, it is expected that cultivation practices would continue to decline within the project area. Grazing practice would be expected to sustain current levels of slightly increase in the future.

Based on a review of NRCS data for northern Nevada, soil series considered as prime farmland include prime farmland if irrigated; prime farmland if irrigated and drained; prime farmland if irrigated and reclaimed of excess salts and sodium; and prime farmland if irrigated and the product of soil erodibility and climate factor does not exceed 60. These soils are prevalent along the Truckee River corridor. However, much of these prime soils are not available for agricultural uses due to extensive urban development.

Agricultural Activities

Truckee Meadows Reach

Most of Washoe County's agricultural activities were, at one time, centered in the Truckee Meadows because of the area's accessible location and soil conditions that were among the best in Washoe County. Today, the county's agricultural land uses have shifted away from the urbanized parts of the Truckee Meadows area to outlying areas east and south (Interior & State, 2008).

Agricultural fields are located from east of Greg Street downstream to the wastewater treatment facility at the mouth of Steamboat Creek and to the south on the UNR Farms.

Livestock grazing and growing alfalfa hay are the primary agricultural uses in the southeast Truckee Meadows area. Areas used for livestock grazing include large portions of the valley floor and the majority of the Virginia Range.

Water for irrigation and livestock is obtained via diversions from the Truckee River. The major diversions to the south in this reach include Steamboat Canal, and the Last Chance, Eastman, and Pioneer ditches (Interior & State, 2008).

Lower Truckee River Reach

Primary agricultural activities in the Lower Truckee River reach are pastureland and alfalfa cultivation. The UNR has an agricultural extension field station at the S-S Ranch property, located within the Tribal boundaries of the PLPT. The ranch serves as a research and educational center in cooperation with the PLPT. There are also several diversions in this reach. The largest diversion is the Truckee Canal, which supports the Newlands Project in the Carson River watershed (Interior & State, 2004).

Other diversions are located on the Pyramid Lake Paiute Indian Reservation.

In Storey County, only land along the Truckee River has irrigation capability (Storey County, 1994). Most irrigation along the river involves gravity-fed diversion canals that divert water from the river. As with most of the agricultural practices along the river in the project area, livestock grazing is predominant in Storey County, and most cultivation is for livestock feed crops, such as alfalfa.

On the Pyramid Lake Indian Reservation, the Tribal Council manages livestock grazing in coordination with BLM. Rangelands on the reservation are used almost exclusively by the PLPT, mostly for cattle and horses. Alfalfa is the primary crop cultivated on agricultural land along the Truckee River within the reservation. As with other agricultural areas along the river, irrigation water on the reservation is diverted from the Truckee River mostly using gravity-fed diversion structures.

5.9.2 Environmental Consequences

This section evaluates the effects of the Truckee Meadows project on active farmland in the project area. It also includes a discussion of affected prime farmland as designated by the USDA. The evaluation of effects to agriculture and prime farmlands is based on maps of active and prime farmland received from NRCS in 2008. The Farmland Conversion Impact Rating Form AD-1006 was used to determine the level of significance of effects to active and prime farmland in the project area.

Significance Criteria

Adverse effects on agriculture and prime farmlands were considered significant if implementation of an alternative plan would result in any of the following:

- Convert substantial active farmland of Statewide or local importance to nonagricultural use; and
- Conversion of prime farmland inconsistent with the Farmland Protection Policy Act and NRCS's internal policies.

No Action Alternative

Under the No Action Alternative, no flood risk management improvements would take place in the project area. Given the economic challenges of sustained active farm cultivation and the shift in water demand from irrigation to municipal and industrial supply within the region, it is expected that cultivation practices would continue to decline within the project area. Grazing practices would be expected to sustain current levels or slightly increase in the future. Existing agricultural land would continue to experience the current frequency of inundation by seasonal flooding into the future.

Alternative 3-Floodplain Terrace Plan

<u>Truckee Meadows Reach</u>

In the Truckee Meadows reach, proposed flood risk management features under the Floodplain Terrace Plan located along the south bank of the Truckee River would have direct and indirect effects on active farms and known prime farmlands.

There are approximately 127 acres of active farmlands located within the project area just west of Rock Boulevard to E. McCarran Boulevard, with the North Edison Way Business Park physically separating the farmed areas. The Ferrari family farms the property west of the business park and the University of Nevada Reno farms the land east of the business park.

Construction of the setback levee along Mill Street would remove approximately 15 acres of active farmland from production. Excavation of the floodplain terraces would remove approximately 34 acres of active farmland from production. Approximately 67 acres of the remaining active farmland would be located within the proposed floodway and would be subject to increased inundation during high water events. Further restricting use of farmland in the floodway would be the placement of the paved recreation trail across the current farmland. Placement of the setback levees would also indirectly convert 6 acres of active farmland due to restricted access to them.

The levee proposed north and east of the UNR Farms Main Facility east of McCarran Boulevard would be constructed on approximately 2 acres of active farmland.

Construction of these flood risk management features would also have short term effects on approximately 18 acres of active farmland that would be utilized as temporary work easements. These lands would be returned to pre-construction conditions when construction is complete. Therefore, temporary disturbance to active farmland related to construction activities would have a less-than-significant effect on agriculture in the Truckee Meadows reach.

Table 5-23 summarizes the effects this alternative would have on active farmland within the Truckee Meadows reach. This plan would permanently convert about 124 acres of farmland under cultivation in this project reach.

Table 5-23. Conversion of Active Farmlands in the Truckee Meadows Reach Under Alternative 3-Floodplain Terrace Plan .

Floodplain Terrace Plan Proposed Features	Active Farmlands (acres)
Flood Risk Management and Recreation	124

Lands required by the proposed project would be purchased and owners would be compensated at fair market value for the lands. While the overall acreage of land available for agriculture would be reduced in portions of the Truckee Meadows reach, the conversion of land for flood risk management would reduce the danger of catastrophic floods and benefit the remaining agricultural land by improving groundwater recharge and nutrient exchange through construction of the floodplain terraces.

To the extent practicable, the top 6 inches of farmland topsoil would be stripped within the levee and floodplain terrace footprints prior to construction of these features. Topsoil would be temporarily stored and reused during post-construction revegetation activities.

Relocation of the Pioneer Ditch would be the responsibility of the non-Federal cost sharing partner. While compensation for abandonment of Pioneer Ditch is an option, this analysis assumes that portions of the ditch would be realigned outside of the project features so that water deliveries would be maintained for the water rights holders that use the ditch. Therefore, effects to delivery of irrigation water to the Pioneer Ditch water users would be less than significant.

Farmland Conversion Impact Rating

The USDA Farmland Conversion Impact Rating Form (Form AD-1006) was resubmitted to NRCS on March 8, 2013 indicating the current plan for this alternative. NRCS returned the evaluation on April 22, 2013. The evaluation indicated that 30 acres of prime and unique farmland and 19 acres of farmland with statewide and local importance would be converted. Following completion of the site assessment criteria, the total point score for the conversion rating was 145, which is below the threshold of 160. Therefore, no further action under the Farmland Protection Policy Act requirements is indicated.

Overall, long-term effects to agriculture and prime farmland in this reach would be considered less than significant for this alternative because it would not convert substantial active farmland of Statewide or local importance to nonagricultural use; and conversion of prime farmland would not be inconsistent with the Farmland Protection Policy Act and NRCS's internal policies..

Lower Truckee River Reach

In general, this alternative would increase peak flows to downstream reaches, resulting in an indirect affect on existing agricultural uses in the Lower Truckee River reach. During the modeled 1% chance event, this alternative would cause a change in Truckee River flows below Vista up to 1,520 cfs, depending on location, relative to modeled baseline conditions. This represents increases in depth of the 1in 100 chance event floodplain between 0 and 1 foot, depending on topography. This increase would not affect existing structures and facilities. Affected areas include land used for agriculture, primarily alfalfa cultivation and livestock grazing. Where changes in flood frequency, depth, and duration are considered high enough to affect the use of these lands as a result of this project, a flowage easement would be purchased by the non-Federal project partner. However, the agricultural use of this land would not change as a result of this alternative. Therefore, long-term indirect affects to agricultural uses in the Lower Truckee River reach would be less than significant.

Alternative 2-Detention Plan

Truckee Meadows Reach

In the Truckee Meadows reach, proposed flood risk management features under the Detention Plan located along the south bank of the Truckee River and within the UNR Farms and Bella Vista Ranch areas of Steamboat Creek would have an effect on active farms and known prime farmlands.

There are approximately 127 acres of active farmlands located within the project area just west of Rock Boulevard to E. McCarran Boulevard, with the North Edison Way Business Park physically separating the farmed areas. The Ferrari family farms the property west of the business park and the University of Nevada Reno farms the land east of the business park.

Construction of the levee along Mill Street would remove approximately 15 acres of active farmland from production. Approximately 73 acres of the remaining active farmland would be located within the proposed floodway and would be subject to increased inundation during high water events. Further restricting use of farmland in the floodway would be the placement of the paved recreation trail across the current farmland. Placement of the levees would also indirectly convert 6 acres of active farmland due to restricted access to them.

The UNR Farms detention basin construction of berms, dikes, and inlet/outlet structures would remove 82.5 acres of active farmland from production. Approximately 552.3 acres of agricultural land within the detention basin would remain in permanent agricultural use through acquisition of flowage easements. Agricultural losses due to flooding would be decreased with this plan. Although flooding of the farmland would be less frequent, such flooding would continue to periodically replenish soil with mineral nutrients from suspended sediment deposition.

The Huffaker detention basin would be located on pastureland used for livestock grazing. There is no prime farmland identified in this area. Active farmland would not be affected by this feature.

Construction of these flood risk management features would also have short term effects on approximately 25 acres of active farmland that would be utilized as temporary work easements. These

lands would be returned to pre-construction conditions when construction is complete. Therefore, temporary disturbance to active farmland related to construction activities would have a less-than-significant effect on agriculture and prime farmlands in the Truckee Meadows reach.

Table 5-24 summarizes the effects this alternative would have on active farmland within the Truckee Meadows reach. This plan would permanently convert about 175.8 acres of farmlands under cultivation in this project reach.

Table 5-24. Conversion of Active Farmlands in the Truckee Meadows Reach Under Alternative 2-Detention Plan .

Proposed Features	Active Farmlands (acres)
Flood Risk Management Features along Mill Street	93.3
UNR Farms detention basin	82.5

Lands required by the proposed project would be purchased and owners would be compensated at fair market value for the lands. While the overall acreage of land available for agriculture would be reduced in portions of the Truckee Meadows reach, the conversion of land for flood risk management would reduce the danger of catastrophic floods.

To the extent practicable, the top 6 inches of prime farmland topsoil would be stripped within the levee footprints prior to construction of these features. Topsoil would be temporarily stored and reused during post-construction revegetation activities.

Farmland Conversion Impact Rating

The USDA Farmland Conversion Impact Rating Form (Form AD-1006) was resubmitted to NRCS on March 8, 2013 indicating the current plan for this alternative. NRCS returned the evaluation on April 22, 2013. The evaluation indicated that 58 acres of prime and unique farmland and 24.5 acres of farmland with statewide and local importance would be converted. Following completion of the site assessment criteria, the total point score for the conversion rating was 145, which is below the threshold of 160. Therefore, no further consideration of the Farmland Protection Policy Act is required.

Overall, long-term effects to agriculture and prime farmland in this reach would be considered less than significant for this alternative because it would not convert substantial active farmland of Statewide or local importance to nonagricultural use; and conversion of prime farmland would not be inconsistent with the Farmland Protection Policy Act and NRCS's internal policies.

Lower Truckee River Reach

The impacts associated with the Detention Plan would be similar to those discussed for the Floodplain Terrace Plan . Overall, long-term effects to agriculture and prime farmland in this reach would be considered less than significant for this alternative.

5.9.3 Mitigation Measures

Alternative 3-Floodplain Terrace Plan and Alternative 2-Detention Plan

Mitigation measures that could reduce effects on agriculture and prime farmlands due to flood risk management and recreation elements are listed below:

- Lands required by the proposed project would be purchased and owners would be compensated at fair market value for the lands.

- Negotiation of temporary easements necessary for construction would include fair compensation for loss of agricultural production experienced by the landowner during that time period. Construction of project features would be phased by construction contract. Once construction is completed for each contract, the temporary easement and staging areas would be restored and returned to pre-project conditions and uses.
- To the extent practicable, the top 6 inches of topsoil in prime farmland areas that fall within the levee and floodplain terrace footprints would be stripped and stored for use during post-construction revegetation activities.

The proposed project alternatives would include securing all lands, easements, and rights-of-way necessary for construction and operation of the project. Project lands are typically secured by purchase of fee title or purchase of easements.

5.10 RECREATION AND OPEN SPACE

5.10.1 Affected Environment

This section describes the characteristics of the recreational facilities and open space resources of Washoe and Storey Counties, the Cities of Reno and Sparks, the PLPT Reservation, and the immediate project area. These characteristics provide baseline information on parks, open space and natural reservations, trails and pathways, reserved riverbank strips, beaches, playgrounds and other recreation areas within the potentially affected project area.

Regulatory Setting

The importance of open space[11] and recreation to the region is appropriately summarized in the following excerpt from Washoe County's Draft Final Regional Open Space & Natural Resources Management Plan (Washoe County, 2008a):

> "With the loss of rural land, there is less undeveloped land, commonly referred to as open space. The southern portion of Washoe County is presently at a stage in its evolution where preserving certain undeveloped lands as open space is critical for both the environment and the economy. The county's attractive landscape, along with numerous outdoor recreational opportunities, is closely linked to our region's quality of life. One of the key quality-of-life factors in the region is the existence of open space, which can directly and indirectly influence numerous other quality-of-life factors, such as water quality and supply, economic growth, health, educational and cultural opportunities, and leisure opportunities. The region's quality of life attracts both people and economic growth to Washoe County. It is listed time and time again as one of the contributing factors, if not the major factor, for new businesses considering relocating to this area."
>
> "The health of the region's tourism industry is also linked to the area's quality of life. Many of the region's businesses emphasize the scenic resources and the recreational opportunities available to visitors and employees in Washoe County. The preservation and management of open space helps provide and enhance these recreational

[11] Open Space is defined as properties with free and legal public access that are generally in a natural state. Open space may include spaces that are inappropriate for access or development for any reason such as sensitive environments or hazardous areas (e.g., landslide areas). Open spaces provide native plant and wildlife habitat, passive recreational opportunities, enhance the scenic character of the region, and allow for preservation of significant cultural and archaeological resources (TMRPA, 2008).

opportunities and quality-of-life benefits."

The number and location of parks, recreational facilities, and open space in the project area is governed by goals and policies set forth in the comprehensive master plans developed by the Cities of Reno and Sparks, as well as Washoe and Storey Counties. As mentioned in Section 5.9 Land Use, the TMRPA is intended to represent a regional consensus reached through a process of public dialog and decision-making to provide a unifying framework for local and regional policies and services. Storey County and the PLPT Reservation are not included in the TMRPA, but they are discussed separately in this section.

Bicycle trails, both for commuting purposes and recreational use, are garnering a more prominent role in the regional makeup. The Regional Transportation Commission (RTC) is responsible for long-range planning for paved bicycle paths.

Local master plans that must conform to the Regional Plan and the Regional Transportation Plan (RTP) are the City of Reno Master Plan, the City of Sparks Master Plan, and the Washoe County Comprehensive Plan. Elements of these master plans relating to recreation and open space are: the County's Public Services and Facilities Element; Reno's Public Services, Facilities, and Infrastructure Plan and its Open Space and Greenways Plan; and Spark's Public Services and Facilities Plan and its Conservation Plan. Washoe County also has a Regional Open Space Plan currently being updated.

Regional Plans

The 2007 Truckee Meadows Regional Plan

The purpose of the Truckee Meadows Regional Plan (Regional Plan) is to coordinate master planning in Washoe County as it relates to land use, infrastructure provision, resource management, and plan implementation (TMRPA, 2008). The Regional Plan promotes an integrated open space and greenways network that links centers and transit corridors to parks, bikeways, floodways, drainage ways, open space, surrounding public lands and facilities, and other outdoor recreation opportunities such as trails, and connects schools, neighborhoods and shopping centers (TMRPA, 2008). The Regional Plan also promotes the development and management of a greater number of community, regional, and neighborhood parks to support the intensification of land use within the region, associated smaller lot sizes, and higher density housing.

Specific to open space, the Regional Plan identifies as part of its planning principles the importance of the region's open space and greenways network, such that open space and the greenways network play an important part in defining the Regional Form (TMRPA, 2008). Local government master plans are required to preserve the natural function and scenic value of mountains, rivers, significant ridgelines, wetlands, aquifer recharge areas, and water bodies as wilderness, habitats, open space, greenways, parks, trails, and recreational areas.

Key goals to achieving the recreation and open space-related principles in the Regional Plan are:

- Goal 1.2 - Local governments and affected entity master plans, facilities plans, and other similar plans will provide for the necessary resources, services, and infrastructure to support the density summarized in Table 1.2.1 of the Regional Plan.
- Goal 2.2 - Local government master plans will be revised to preserve the scenic, natural, public safety, and recreational values of sensitive land areas by constraining development on designated water bodies and ridgelines, natural slopes over 30 percent, and certain other lands.
- Goal 2.4 - The Regional Plan requires local governments to revise their master plans to establish

a coordinated network of open space and greenways, wherever possible, that links urbanized areas, public facilities including schools, recreation opportunities, and surrounding public lands.

These goals are meant to address important regional objectives as set forth in the Regional Plan. Objectives of relevance to the recreation and open space discussion are:

- Ensure that necessary public services and facilities to support new development are or will be available and adequate, based on adopted levels of service (LOS) standards, at the time the effects of new development occurs.
- Preserve [our] designated natural resources and open space.
- Ensure implementation of designs that contribute to safe, diverse, and vital, bicycle-oriented and pedestrian-oriented communities.

The Regional Transportation Plan (RTP) and Regional Transportation Improvement Program

Similar to TMRPA, the RTC coordinates transportation planning at the regional level, as laid out in its RTP (RTC, 2004). Long-range bicycle and pedestrian planning goals and improvements are identified in the RTP's Bicycle and Pedestrian element (RTC, 2004). Short-range (5-year) transportation planning goals for the region are included in the Regional Transportation Improvement Plan (RTC, 2007). State and Federal regulations mandate the development of a Regional Transportation Improvement Plan. Local agencies and transportation operators must have their major projects approved in the Regional Transportation Improvement Plan to qualify for most categories of state and Federal transportation funding (RTC, 2007).

The RTP recognizes that increased bicycle travel within the County is a valuable means to help achieve the regional goal of improved air quality and decreased traffic congestion (RTC, 2004). RTC is required to develop and carry out comprehensive and cooperative transportation plans that incorporate programs and facilities for bicyclists and pedestrians. Bikeways in the Truckee Meadows currently are classified into three types:

- Shared Use Facility/Bicycle Path;
- Bicycle Lane; and
- Bicycle Route

The objectives for the bicycle/pedestrian element emphasize the use of bicycles as part of the balanced transportation system that will offer alternatives to the single-occupant vehicle and increase non-auto travel. To integrate bicycle facilities as elements of a comprehensive transportation system, the RTP encourages decisions at the regional and local levels that increase the use of safe bicycling. The focus for the RTP is on completing a connected system of bikeways for non-motorized travel (RTC, 2004).

<u>County Plans</u>

Washoe County Regional Open Space and Natural Resources Plan

The 2008 Washoe County Regional Open Space and Natural Resources Plan provides the framework, goals, and policies for the management of natural resources and open spaces in Washoe County. This plan's objective is to protect the region's natural resources and open space through a series of goals and policies that address biodiversity, cultural resources, natural hazards, recreational resources, visual and scenic character, and water resources (Washoe County, 2008a). The implementation

component of the plan focuses on the following:

- Recommended changes to the County's Comprehensive Plan, Development Code, and implementing ordinances to facilitate carrying out the goals and policies of the plan;
- Recommended actions to carry out the goals and policies for achieving the plan's envisioned, desired outcomes;
- Recommended areas for acquisition and retention for conservation, protection and management of open spaces and natural resources; and
- A suggested time frame for initiating key actions and projects.

The regional open space plan is intended as a cooperative effort to benefit the entire region. The open space plan is designed to be used as a tool by the Cities of Reno and Sparks and Washoe County to assist in the preservation of open space in the area.

Washoe County Public Services and Facilities Element

The Public Services and Facilities Element of the Comprehensive Plan outlines the physical facilities and service standards appropriate to serve the residents of Washoe County. Included in these services and facilities is parks and recreation. The policies and action programs establish a general framework to guide the provision and timing of public services and facilities so they are available concurrent with new development (Washoe County, 2010).

The County agency that manages the scheduling and development of parks and recreational facilities in the unincorporated areas is the Washoe County Regional Parks and Open Space Department and the Parks Commission. The primary mission of the department and the commission is to provide opportunities to meet identifiable recreation, park and open space needs for the residents of Washoe County. This is achieved, to a large extent, by conserving and enhancing the County's unique features through preservation of lands with scenic, natural, historic and recreational value. Implementation of the department's mission is guided by the Washoe County Regional Parks and Open Space Master Plan.

The regional parks master plan is comprised of four Park District Plans based on the four residential construction tax districts in unincorporated Washoe County. Washoe County's Regional Parks and Open Space Department is in the process of updating individual master plans for many of their planning districts.

Washoe County has adopted the following LOS standards for parks facilities:

- Neighborhood/Community Park (5 to 50 acres typical); 7 acres/1,000 persons
- Regional Park (100 acre minimum size); 20 acres/1,000 persons

Storey County Master Plan

Storey County provides public lands for recreational purposes, as administered under Chapter 6 (Public Facilities and Safety) of the County Master Plan. The County park and recreational facilities are organized into four districts, with the River District being the closest to the project area. The River District stretches approximately 25 miles along the south bank of the Truckee River, which is the northern boundary of Storey County, and contains Lockwood Park, located in Lockwood on Peri Ranch Road.

Other parts of the Storey County Master Plan indicate that recreational activities play an important role in the lifestyles and economy of the county. Recreational activities identified in section 6.3 of the Master Plan Public Safety element (Storey County, 1994) include hiking, backpacking, sightseeing, photography, motorboating, shooting (non-hunting), fishing, primitive camping, off-highway vehicle use, horseback riding, rock-hounding, and hunting. In planning the use of public lands, the effect on recreation should be strongly considered (Storey County, 1994).

City Plans

City of Reno Public Service, Facilities, and Infrastructure Plan

The City of Reno Public Service, Facilities, and Infrastructure Plan defines a coordinated and sustainable pattern for infrastructure and facility expansion and identifies the facility and infrastructure standards for both existing and forecasted populations. It guides how the City will interconnect and support the planned growth within the City of Reno and its Sphere of Influence (SOI). Specific to recreation and open space, this plan establishes the City's goals and policies for bicycle and pedestrian facilities, and city parks and recreation facilities (City of Reno, 2007c).

This plan identifies the following goals for bicycle and pedestrian facilities within the city:

- Reno should ensure that the pedestrian environment is safe, accessible, interconnected, easy to use, and enjoyable.
- Reno should implement an attractive and safe bicycle system by expanding and improving the bikeway network and ensuring that new development provides attractive and functional facilities at commercial and public destinations. Reno's adopted Open Space and Greenways Plan identifies priority bikeway and trail projects.

The Parks and Recreation section of this plan serves as the Recreation Plan required by Nevada Revised Statute 278.160. The Recreation Plan addresses a comprehensive approach to the establishment and expansion of a park system to include recreation areas, natural areas, recreational facilities, riverbank areas, playgrounds, and other programmable space set aside for recreational uses for the residents of Reno (City of Reno, 2007c).

In addition to designing and constructing park amenities, park development also includes attention to public art, accessible design/features, community safety by design, "green" planning initiatives, planning to reduce conflicts with wildlife, and sound urban forestry and horticultural practices. The Recreation Plan also establishes LOS objectives for Reno's parks and recreation facilities (City of Reno, 2007c).

Reno's park categories include neighborhood, community, pocket, and regional. Each park category fulfills a different role in meeting the recreation needs of Reno residents. Neighborhood parks are the cornerstone of the City's overall park system and a primary focus for attainment. Neighborhood parks are meant to provide the basic recreational needs of the residential population in the surrounding neighborhood. Community parks offer a wide range of recreational opportunities for area residents and larger segments of the community, and include, but are not limited to sports fields/complexes, aquatic facilities, recreation centers, dog parks, cultural and special event venues, natural features that may require preservation, and on-site parking, in addition to amenities mentioned under neighborhood parks.

City of Reno Open Space and Greenways Plan

The City of Reno Open Space and Greenways Plan serves as the primary regulatory document for

the protection and acquisition of open spaces and greenways for the City of Reno for the next 20 years. This plan also satisfies the conservation element requirement called for in the Regional Plan (City of Reno, 2007b).

The plan describes the goals and policies developed to manage the City's open space and greenways. Criteria for identifying and prioritizing open space areas for potential preservation are defined. Based on these criteria, several high priority open space areas are identified. In addition, connectivity and access are addressed, focusing on the importance of connections of trail systems in the City. Trails and bikeways play a vital roll in the plan by filling in the gaps between existing facilities and proposed activity centers in the City. Finally, the plan identifies revisions to City code that could contribute to the successful implementation of the plan (City of Reno, 2007b).

City of Sparks Public Services and Facilities Plan

The East Truckee River Canyon has been identified as an area subject to cooperative planning and is designated for future annexation by the City of Sparks. The Regional Plan requires that the City of Sparks, with input from Washoe County, update the Master Plan for this area.

City of Sparks 2002 Truckee Meadows Regional Plan

The City of Sparks' 2002 Truckee Meadows Regional Plan defines Cooperative Planning Areas as areas within the Truckee Meadows where more than one jurisdiction has an interest in the way the land is developed. As mentioned above, the East Truckee River Canyon has been identified as an area subject to cooperative planning. The Regional Plan requires that the City of Sparks, with input from Washoe County, update the Master Plan for this area (City of Sparks, 2011). The East Truckee Canyon Area Plan was expected to be completed by late 2010. The following outlines the current process for updating this plan.

- Phase I of the update process focused on existing conditions within the area including land use, wildlife habitat areas, slopes, and floodplain areas. The information was collected and presented through a series of meetings with property owners, interested parties, the Washoe County East Truckee Canyon Citizen Advisory Board, and the Storey County Planning Commission. This phase of the update resulted in the draft area plan.
- Phase II involved studying the future infrastructure needs for the plan area. These studies have included determining the future demands, costs, and where appropriate, locations for key public facilities such as roads, water, wastewater, electricity, police and fire protection.
- The final phase of this process will involve integrating the recently completed facilities studies with the draft area plan.

City of Sparks Draft Conservation and Natural Resources Plan

The Conservation Plan was developed in accordance with the NRS that enable a city to prepare a master plan that can cover all or parts of a city and its SOI. NRS 278.160 requires that all city master plans cover conservation, development, and utilization of natural resources. The underlying goal of the Conservation Plan is to identify, protect and enhance the natural environment for future generations to enjoy. As such, it takes collaboration and coordination between everyone who is concerned about the future of the natural environment. The Conservation Plan is a big-picture guide that identifies key natural features, hazards, resources and habitats and provides goals, objectives and policies to protect and enhance these areas. The City of Sparks Draft Conservation and Natural Resources Plan was published in October 2010 (City of Sparks, 2011).

Existing Recreation and Open Space

The project area contains a wide variety of recreational features and opportunities. Parks and recreational facilities, open space and greenways, trails, and water-related recreational activities afford a diverse recreational experience within Washoe County and, to a lesser extent, Storey County.

The Truckee River is commonly identified as the most significant natural resource in the Reno-Sparks metropolitan area. Regional, county, and city development plans include goals of increasing accessibility to the river for residents while striving to maintain or enhance the natural and scenic value of the river corridor.

To that end, aside from the mountainous periphery of the Truckee Meadows area, Reno's most significant open spaces are concentrated along the Truckee River (City of Reno, 2007b). In addition, the Cities of Reno and Sparks have developed several parks along a greenway extending much of the length of the river from just west of downtown Reno to Vista. This system of parks and greenways is connected by the Truckee River Trail. The trail provides extended river access and a place for people to enjoy the natural beauty of the Truckee River.

The Truckee River downstream of Vista provides many outdoor recreation opportunities, mainly associated with water-based activities. The proximity to the Reno/Sparks urban area makes this portion of the lower Truckee River a popular recreation destination. However, direct public access to the river along this reach is limited. Activities are primarily centered on fishing, but include boating, camping, swimming, hiking, picnicking, rafting and tubing.

A recent regional effort is the establishment of the Tahoe-Pyramid Bikeway. The objective of the bikeway is to establish a trail that would allow recreationists to follow the Truckee River by foot or by bicycle from its source at Lake Tahoe to its desert terminus, Pyramid Lake. Current open sections of the bikeway include stretches from Lake Tahoe to the town of Truckee, from Verdi to Vista following the Truckee River Trail, and a trail running through the Pyramid Lake Paiute Reservation from Wadsworth to Pyramid Lake (Tahoe-Pyramid Bikeway, 2011).

Truckee Meadows Reach

Reno, Sparks, and Washoe County each have jurisdiction over different parts of the Truckee Meadows reach. The City of Sparks' jurisdiction primarily encompasses the north side of the Truckee River from Highway 395 to Tracy in the Lower Truckee River reach. Washoe County has jurisdiction along much of the river's south bank; however, Reno's SOI also extends into this area. Along Steamboat Creek, Washoe County and City of Reno boundaries alternate southward to the South Truckee Meadows area.

The City of Sparks' facilities along the Truckee River include Fisherman's Park, Gateway Park, Rock Park, Glendale Park, Cottonwood Park, and the Truckee River Greenbelt. Connecting each of these features on the north bank is the Truckee River Trail. Facilities located within the vicinity of the North Truckee Drain include Wild Island Family Adventure Park, the Don Mello Sports Complex, and the Charlie Smith Youth Fields. Open space along the south bank of the river in this reach is a mixture of native riparian habitat and agricultural lands primarily associated with the UNR Farms facilities.

In the Truckee Meadows reach, aside from the river, the other focal point to open space and recreational activities is the Steamboat Creek corridor. The Steamboat Creek area offers one of the greatest remaining opportunities in the greater Truckee Meadows to create a linear open space area that would run adjacent to the creek (City of Reno, 2007b). This linear open space could potentially connect valuable wetland areas in the Reno SOI with Steamboat Creek, south Rosewood Lakes and Hidden

Valley, Hidden Valley Regional Park, and ultimately the Truckee River to the north.

Recreational areas located within the vicinity of Steamboat Creek include Mira Loma Park, Hidden Valley Regional Park, Hidden Valley Golf Course, and the Rosewood Lakes Golf Course.

Lower Truckee River Reach

In this reach, The City of Sparks SOI extends to Tracy along the north side of the river. Washoe County is the responsible agency from Tracy downstream to the PLPT reservation. Occasional Federal land holdings managed by the BLM are interspersed within these two stretches of the river. The south side of the river is in Storey County jurisdiction up to the tribal lands boundaries just upstream of Wadsworth.

Unlike the three upper project reaches, the Lower Truckee River reach does not have many established parks and recreational facilities. However, a portion of the Truckee River Greenbelt (a distant extension of the greenbelt in the Meadows reach) is located just downstream of Rainbow Bend. The greenbelt in the lower reach extends approximately 700 feet along the north bank of the channel (Washoe County, 2005).

Pyramid Lake, famous for its LCT fishery, is located about 35 miles north of Reno on the Pyramid Lake Paiute Indian Reservation. Pyramid Lake is the State's largest lake (that is entirely located within the State of Nevada). Along with LCT, other species of fish within the lake are the Lahontan tui chub, the Cui-ui, the Tahoe sucker, and the Sacramento perch. Rugged mountain ranges that flank the lake and large "tufa" rock formations attract many sightseers. Water skiing, jet skiing, camping, and observing wildlife are also popular activities at the lake (Pyramid Lake Fisheries, 2008).

5.10.2 Environmental Consequences

Significance Criteria

Adverse effects on recreation were considered significant if implementation of an alternative plan would result in any of the following:

- Substantially disrupt any institutionally recognized recreational facility or activity.
- Be inconsistent with the Truckee Meadows Regional Plan.
- Substantially reduce availability of and access to recreational or open space areas.

No Action Alternative

The No Action Alternative would have no effects on existing recreation or open space resources in the project area. The preservation and management of open space and recreational opportunities are key regional objectives for maintaining and improving quality-of-life benefits for residents within the region of the cities of Reno and Sparks. Recreational activities would continue at already existing facilities and locations.

Given the importance assigned to recreational opportunities for its residents and visitors, local and regional municipalities would continue to pursue and implement recreation and open space goals as outlined in their planning and community development documents without Federal participation. Funding from other Federal programs could also be pursued to implement recreation and open space objectives.

Alternative 3-Floodplain Terrace Plan

Truckee Meadows Reach

The primary flood risk management features in the Truckee Meadows reach for the Floodplain Terrace Plan are setback levees, floodwalls, scour protection, and floodplain terraces.

The construction of the proposed flood risk management features in the Truckee Meadows reach would require the temporary use of parklands and would result in some short-term direct and indirect effects during construction, but no significant long-term effects on recreational use or facilities in this reach would occur. The establishment of the temporary work easements and staging areas would result in short-term potentially significant effects to recreational facilities and open space areas in the Truckee Meadows reach. These short-term effects include:

- Closing portions of the River Walk Trail during construction and providing detours for the public.
- Limiting access and availability of the Tahoe-Pyramid Bikeway.
- Prohibiting or limiting the availability and accessibility to several parks and open space areas due to temporary work easements and staging areas during project construction, including several existing walking/biking trails that would be closed or detoured.
- Prohibiting or limiting water-related activities during in-water construction activities.

The establishment of the temporary work easements and staging areas would result in short-term potentially significant effects to the following parks and would require temporary closure during the construction period:

- Fisherman's Park;
- Gateway Park;
- Rock Park;
- Whitewater Park at Rock Boulevard;
- Glendale Park;
- Cottonwood Park; and,
- The Truckee River Greenbelt.

Review of the Tahoe-Pyramid Bikeway online maps (Tahoe-Pyramid Bikeway, 2011) and the project plans shows that availability and access to the bikeway would be temporarily affected by flood risk management activities, temporary work easements, and temporary access roads within the Truckee Meadows reach at the following locations:

- Highway 395 to Galletti Way (north of the river);
- Glendale Avenue to Greg Street (north side of the river);
- Rock Boulevard to McCarran Boulevard (north side of the river); and,
- McCarran Boulevard to Vista (north side of river).

The Floodplain Terrace Plan would temporarily affect approximately 5 acres of recreational facilities and open space areas by construction of the proposed flood risk management features in the Truckee Meadows reach. However, detour routes would be established during construction for

pedestrians and bicyclists to continue using trails and the bikeway. Signage regarding access limits and detours for trails and parks would be coordinated with the city parks and recreation department and posted in the appropriate areas along the walkways. Once construction is completed temporary work easements and staging areas would be restored and returned to pre-project conditions. These actions would reduce short-term, construction related effects of the proposed flood risk management features on recreational facilities in the Truckee Meadows reach to less-than-significant.

As shown in Table 5-25, long-term effects in the Truckee Meadows reach would include the construction of floodwalls and levees on approximately 18 acres of park land and the greenbelt along the north bank of the river. Another 8 acres would be affected as a result of bank and bridge scour protection.

Table 5-25. Acres of Recreational and Open Space Areas Affected by Flood Risk Management Features in the Truckee Meadows Reach.

Recreational/Open Space Area	Flood Risk Management Features	Acres of Recreational/Open Space Areas to be Affected
Truckee River Greenbelt/Trail from Rock Boulevard to McCarran Boulevard	Levee and floodwall construction	11.0
	Bank and bridge scour protection	6.8
Glendale Park	Levee and floodwall construction	4.0
	Bank scour protection	0.1
Cottonwood Park	Levee and floodwall construction	2.9
	Bank scour protection	0.7
Fisherman's Park	Bridge scour protection	0.1
Total		**25.6**

These flood risk management features would result in long-term potentially significant effects to the existing recreational facilities and open space areas along the north bank of the Truckee Meadows reach. In addition, USACE policy does not allow for the establishment of woody vegetation on and within 15 feet of the levees and floodwalls. While these levee integrity restrictions would have an indirect effect on the recreational experience at these locations, long-term use of the parks would remain the same following construction. In addition, landscaping and architectural features would be incorporated into the setting where park features are affected by levees and floodwalls. Therefore, the proposed flood risk management features in the Truckee Meadows reach would result in a less-than-significant long-term effect on recreational facilities.

While flowage easements are called for on all of the parks and greenbelts in this reach to establish a floodway, the frequency that these areas would be inundated is not expected to increase substantially from existing conditions; therefore, day use at these locations is not expected to be affected significantly.

Construction of flood risk management features, particularly on the south side of the river, provide opportunities for new recreational features within the footprint of this alternative. Proposed recreation features in the Truckee Meadows reach for this alternative include new kayak launch points, picnic areas, a community park, fishing access points, and trails. Refer to Appendix A for the proposed location of the recreation plan features.

These improvements would provide increased opportunities for recreational activities for the public within this reach of the Truckee River which would be considered a beneficial effect of the project.

The long-term effects of the proposed recreation features in the Truckee Meadows reach would include the addition or enhancement of existing recreational facilities in an area that is long-established for recreational use. With approximately 150 acres of open space created through the setback levees and terracing associated with the flood risk management north of Mill Street between Greg Street and McCarran Boulevard, opportunities would expand substantially south of the river.

Open space areas will have hiking trails associated with them in several locations. More than 22,500 linear feet, or 4.3 miles, of new paved and dirt trails would be constructed in this project reach, primarily in the new open space area south of the river. In addition, approximately 25,000 linear feet of levee/floodwall maintenance roads would be available for hiking and biking opportunities. This would more than double the length of currently available recreational trails in the Truckee Meadows reach.

The new trail system would also connect to 17 cobble access points established at the river's edge for recreational activities such as fishing and kayaking. The general locations of the cobble access points are shown in the proposed recreation plan included in Appendix A.

Finally, the recreation plan calls for 34 new picnic locations, including 2 picnic shelters in the south side recreation area. Associated with the picnic shelters would be a parking lot, playground, public restroom, and trailhead to the new trail system. Figure 5-6 shows the proposed layout of the recreation facilities in the new open space area south of the river, between Rock Boulevard and McCarran Boulevard.

Temporary use of portions of recreational or open space lands may be required for temporary work easements or staging areas during construction and would have limited short-term effects on their uses. Detour routes would be established during construction for pedestrians and bicyclists to continue using trails and the bikeway. Signage regarding access limits and detours for trails and parks would be coordinated with the city parks and recreation department and posted in the appropriate areas along the walkways. Once construction is completed, temporary work easements and staging areas would be restored and returned to pre-project conditions. Therefore, construction of the proposed recreation features would result in a less-than-significant effect on recreational and open space lands in the Truckee Meadows reach.

Overall, the increase in open space area and recreational facilities would be a beneficial effect and would contribute to achieving long-term recreation goals for the Cities of Reno and Sparks and Washoe County to provide additional recreational and open space areas along the Truckee River. The Floodplain Terrace Plan would be consistent with the Truckee Meadows Regional Plan recreation and open space goals.

Lower Truckee River Reach

This plan would have no direct effect on recreation and open space in the Lower Truckee River reach because project features are not proposed in this reach. Indirect effects from induced flows are not expected to occur because of the negligible change in depths, duration, and frequency for the higher chance occurrence flood events.

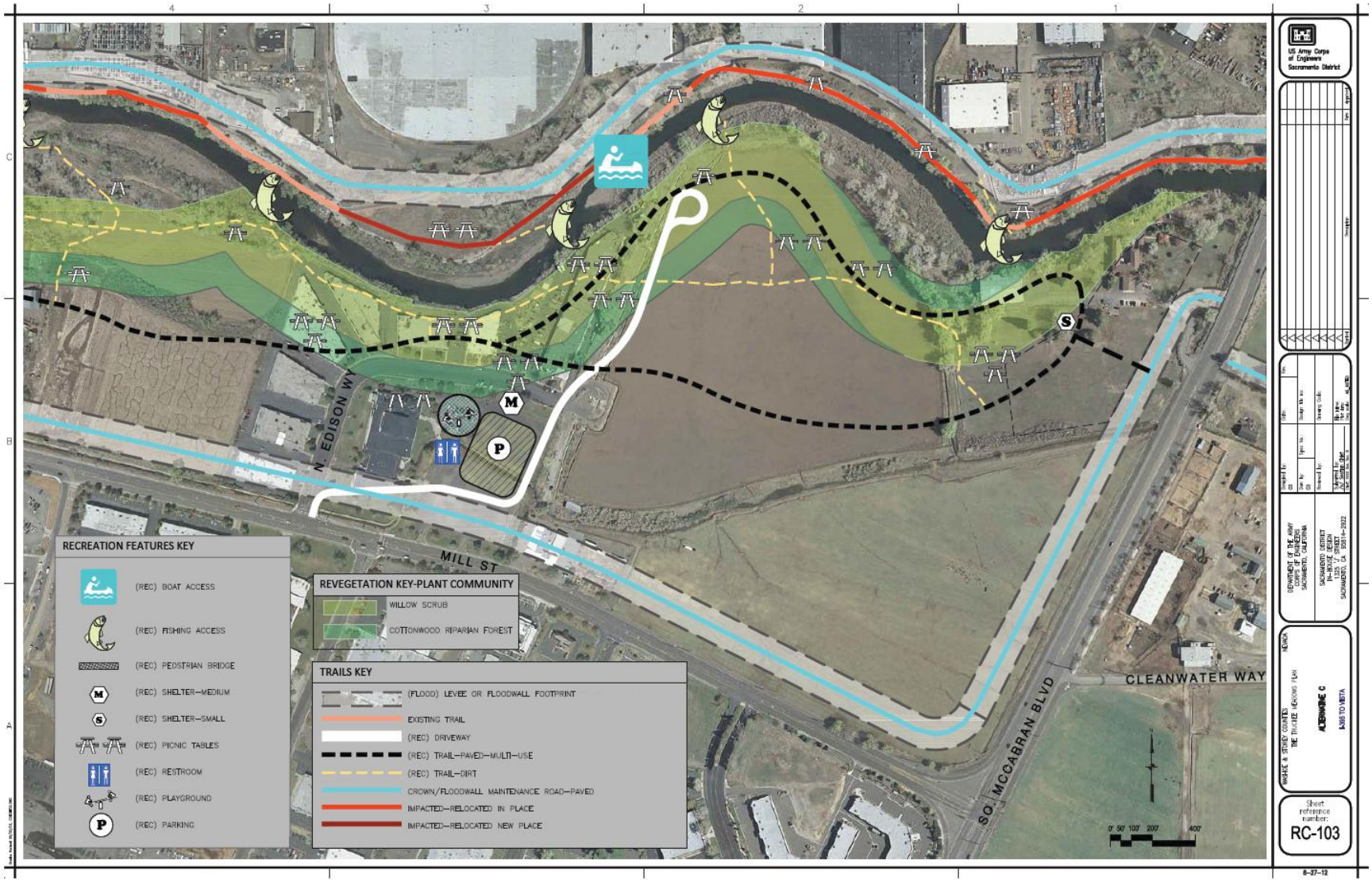


Figure 5-6. Proposed Recreational Features Between Rock Boulevard and McCarran Boulevard

Alternative 2-Detention Plan

Truckee Meadows Reach

Recreational impacts associated with the Detention Plan would be similar to those discussed for the Floodplain Terrace Plan . The construction of the proposed flood risk management features in the Truckee Meadows reach would require the temporary use of parklands and would result in some short-term effects during construction, but no significant long-term effects on recreational use or facilities in this reach would occur. The establishment of the temporary work easements and staging areas would result in short-term potentially significant effects to recreational facilities and open space areas in the Truckee Meadows reach. Long-term losses of recreational areas to accommodate project features would be offset by the addition or enhancement of existing recreational facilities. Overall, the increase in open space and recreation would be a beneficial effect and would contribute to achieving long-term recreation goals for the region.

Lower Truckee River Reach

This plan would have no direct effect on recreation and open space in the Lower Truckee River reach because project features are not proposed in this reach. Indirect effects from induced flows are not expected to occur because of the negligible change in depths, duration, and frequency for the higher chance occurrence flood events.

5.10.3 Mitigation Measures

Alternative 3-Floodplain Terrace Plan and Alternative 2-Detention Plan

Mitigation measures to minimize the temporary, short-term effects to recreational areas and open space include the following:

- Use of existing recreational and open space areas for temporary work easements and staging areas would be coordinated with the appropriate city, county and state management authorities for each recreation and open space facility.
- Trail detours and closures would be coordinated with the appropriate agencies to minimize effects to pedestrians and bicycle traffic.
- Construction of project features would be phased by construction contract.
- Once construction is completed for each contract, the temporary easement and staging areas would be restored and returned to pre-project conditions and uses.

For safety purposes, the following mitigation measures have been identified:

- Access would be restricted along the Truckee River at and near in-channel construction activities.
- Signage regarding access limits and detours for trails and parks would be coordinated with the appropriate city parks and recreation department and posted in the appropriate areas upstream and downstream of construction sites.
- Temporary portage sites would be established to enable boaters to exit the river and detour around the construction area.

The following mitigation measures have been identified to mitigate for construction and installation of flood risk management features:

- Landscaping and architectural features would be incorporated in the setting where features are affected by levees and floodwalls.

5.11 AESTHETIC RESOURCES

5.11.1 Affected Environment

This section evaluates the effects of the proposed alternatives on the aesthetics in the project area. This evaluation is based on the changes in character and quality of views as compared to existing conditions.

Generally, aesthetic resources include natural resources, landforms, vegetation, and man-made structures in the environment that generate one or more sensory reactions and evaluations by the observer. These sensory reactions are traditionally categorized as visual, auditory, and olfactory responses. The visual sense is the predominant reaction of the observer and will be the focus of this section.

Regulatory Setting

NEPA establishes that the Federal government use all practicable means to ensure safe, healthful, productive, and aesthetically and culturally pleasing surroundings for all Americans (42 USC 4331[b][2]). Current planning guidance specifies that the Federal objective of water and related resources planning is to contribute to NED consistent with protecting the Nation's environment. USACE established a number of environmental goals, including: (1) preservation of unique and important aesthetic values; and (2) restoration and maintenance of the natural and man-made environment in terms of variety, beauty, and other measures of quality (USACE, 1988).

The importance of maintaining the scenic quality of the region is reflected in the regional, county, and local planning documents that define goals, policies, and regulations that are established to guide the development of the region. The city and county master plans, comprehensive plans, area plans, and specific plans must conform to the goals, policies, and principles established in the Truckee Meadows Regional Plan developed by the TMRPA (TMRPA, 2007). Goals and policies applicable to the preservation of the region’s scenic values are identified below.

<u>Truckee Meadows Regional Plan (amended 2007)</u>

The Regional Plan requires local government master plans to preserve the natural function and scenic value of mountains, rivers, significant ridgelines, wetlands, aquifer recharge areas, and water bodies as wilderness, habitats, open space, green space, parks, trails and recreational areas. Goal 2.1 and 2.2 of the regional plan defines the actions to be taken by local governments and agencies to achieve that objective.

Goal 2.1. To better coordinate natural resource management, local governments will prepare integrated plans to address natural resources in the region, in consultation with the community and key stakeholders.

Goal 2.2. Local government master plans will be revised to preserve the scenic, natural, public safety, and recreational values of sensitive land areas by constraining development on designated water bodies and ridgelines, natural slopes over 30 percent, and certain other lands.

<u>Washoe County Master Plan, Conservation Element (2010)</u>

The 2010 Washoe County Master Plan Conservation Element is presently the jurisdictional

County planning document in Washoe County in regards to scenic resources. The current Goals and Policies pertaining to scenic resources are listed below.

Goal One: Acquire, manage and maintain lands to protect scenic resources.
Policies

Policy C.1.1 The criteria by which lands are acquired for public use, particularly those acquired for the development of park sites, will be based in part on the conservation of scenic resources. When appropriate and if possible, scenic resources will be incorporated into the development of park sites.

Policy C.1.2 Washoe County will continue to support and participate in the management actions, efforts, and on-going projects of the BLM for the conservation and preservation of officially designated wilderness areas within Washoe County.

Goal Two: Conduct development so that an area's visual features and amenities are preserved.

Policy C.2.1: The Washoe County Department of Community Development shall maintain maps depicting valuable scenic areas, including but not limited to, prominent ridgelines, playas, and other unique scenic features. These maps shall be used to determine, in part, the land use and public services and facilities appropriate for each planning area. These maps, which may be specific to and contained within each Area Plan, shall also be used during development review to identify areas where scenic resource assessment and possible mitigation measures may be required.

Policy C.2.2: At the direction of the Board of County Commissioners, and if desired by planning area residents, the Washoe County Department of Community Development will prepare and implement design guidelines and standards specific to each planning area that will protect the scenic resources, provided:

a. The guidelines or standards do not have the affect of being discriminatory, either financially or socially;

b. The guidelines or standards do not conflict with provisions of private Conditions, Covenants and Restrictions, homeowners associations, etc., but if conflicts do arise, the more stringent standard applies, if applicable; and,

c. The guidelines or standards do not conflict with other plans, policies, or regulations.

Policy C.2.3: Each development proposal shall be evaluated with the intent to preserve visually prominent ridges and escarpments. Evaluation shall address mitigation of the effects on visual appearance, scarring of hillsides, and the impact of increasing access in roadless areas.

Policy C.2.3.1: The Washoe County Department of Community Development will request project design elements (e.g. clustering of buildings, visual or aesthetic standards, and buffering) in areas found to have scenic value in order to avoid loss or degradation of the resource.

Policy C.2.3.2: Setbacks shall be encouraged during development review when the proposed development is near a prominent natural feature, or where the downward slope is undeveloped or has limited development potential.

Policy C.2.3.3: New billboards, signage and exposed utility poles that contribute to visual clutter shall be discouraged during development review. Utilities shall be placed underground where possible.

Washoe County Master Plan, Land Use and Transportation Element (2010)

One of the minimum criteria for acceptance of development applications as identified in the county's Land Use and Transportation element is that development plans preserve areas of scenic and historic value. Pertinent policies in the land use and transportation element are shown below.

Policy LUT.10.1. Facilitate the protection of view corridors within scenic corridors. A methodology (as determined within a public process) should be developed to identify and protect view shed corridors.

Policy LUT.10.5. Preserve the views along roadways and established trails by designating scenic corridors along roadways and trails that have exceptional views (as defined in County Area Plans). Design guidelines should be developed to protect the view sheds.

Policy LUT.15.3. Preserve and promote the rural communities and rural area's natural, historical, scenic and recreational resources to visitors.

Washoe County Master Plan, Area Plans

As described above in Section 5.8 Land Use, County area plans in the project area include: Verdi, Northwest Truckee Meadows, Southwest Truckee Meadows, Northeast Truckee Meadows, Southeast Truckee Meadows, and Truckee Canyon. Each of these area plans also includes goals and policies for the protection of scenic/recreational/cultural resources within the specific plan area.

Regional Setting

Washoe County offers a wide variety of scenic attractions for residents and out-of-state visitors. The open spaces, clean air and natural resources attract many people who want to get away from urban congestion. The scenic opportunities afforded in the county, including mountains, deserts, canyons, and lakes, contribute to an aesthetically diversified environment, provide educational and scientific opportunities, are an important part of tourism, make the county an attractive work place, and contribute to the county's unique character. Part of the county's scenic appeal can also be attributed to its many cultural resources and architecturally significant and historic places.

The Conservation Element of the Washoe County Comprehensive Plan serves as the conservation "plan" for unincorporated Washoe County and outlines policies and action programs for the conservation and preservation of natural resources. The Conservation Element was first adopted in 1991 and was comprehensively updated in 2008. The Conservation Element defines scenic resources as features "including but not limited to sites of unique scenic value, such as prominent rock outcroppings and ridgelines. Specific scenic resources will be identified through a methodology determined within a public process."

While Washoe County contains a variety of uses and views that contribute to overall aesthetic quality, the county has identified areas of distinctive aesthetic quality, or those considered as having valuable views, as Scenic Resources. Scenic Resources include those that are identified on the Topographic and Scenic Features Map of the county's *Comprehensive Plan, Draft Conservation Element Update* (Washoe County, 2009).

Many areas in northern Washoe County managed by the BLM were designated as National Conservation Areas in 2000. However, these areas are not in the vicinity of the project. The county also includes State and Nationally designated scenic byways, such as the Pyramid Lake Scenic Byway (SR

445 along the western shore of Pyramid Lake), the Sutcliffe/Nixon Road (SR 446), Gerlach Road (SR 447), and the Mount Rose Scenic Byway (SR 431).

Pyramid Lake offers fishing, boating, camping and other year round recreational activities. Pyramid Lake is widely acclaimed as North America's most beautiful desert lake. Its rugged character and undeveloped open space appeals to both Tribal members and visitors from around the world (PLPT, 2010).

Storey County is characterized by high desert mountain ranges that are covered with a blend of pinion, juniper, and sage brush. The County is the second-smallest in Nevada, at approximately 262-square-miles, but offers a wide variety of scenic attractions for residents and visitors. Storey County is characterized by open spaces and many cultural resources and architecturally and historically significant places.

Project Area Setting

Truckee Meadows Reach

Within the city of Sparks, the northern bank along the Truckee River has been developed into a series of riverfront parks to enhance public contact with the river for fishing, picnicking, jogging, and passive pursuits. This series of parks are linked by a greenbelt bikeway that also provides scenic views of the Truckee River. Additionally, the hillsides in and around Sparks provide an important visual backdrop for the city (City of Sparks, 1992).

The Steamboat Creek corridor area is characterized by deeply incised, steep, and high banks with sparse willows. The lower portion of the reach of Steamboat Creek contains a lake that parallels the Rosewood Golf Course and a natural protected wetland along the west side of the current channel (Washoe-Storey Conservation District, 2000). Steamboat Creek and its tributaries support riparian vegetation and provide habitat for various types of water fowl and small mammals.

The southeast Truckee Meadows area contains several outstanding scenic resources. The Virginia Range serves as the eastern boundary of the Truckee Meadows and is highly visible from almost anywhere in the valley. Contrasts of color and vegetation type, as well as rugged terrain, make these mountains an important visual resource. The Geiger Grade, a historic passage to Virginia City, provides a beautiful panorama of the southern Truckee Meadows and the Sierra Nevada. The ranches of the southeast Truckee Meadows encompass large areas of open space, providing a sharp contrast to the developing areas of Reno and Sparks. The Huffaker Hills and Rattlesnake Mountain are distinct natural landmarks visible throughout the Truckee Meadows.

Lower Truckee River Reach

The lower Truckee River flows through a narrow canyon, the Truckee Canyon, east of Reno and Sparks. The Truckee Canyon has outstanding scenic resources including the Truckee River, surrounding canyons, and mountain ranges. The scenic corridor, from I-80 as it passes through the Truckee Canyon, provides views of rugged mountain slopes and escarpments that define the Truckee Canyon. Contrasts of color and elevation make these mountains an important visual resource. Upland vegetation consists of dry grassland and sagebrush scrub. The river ribbons through this narrow valley and is outlined by sporadic strands of mature cottonwoods with rural residences and small ranches straddling both sides. Other built elements include overhead utilities, a railroad, fences, and dirt roads. I-80 follows along the northern slope of the canyon, usually benched into the side of the walls of the canyon (the southern end of the Pah Pah Range), approximately 100 to 300 feet above the valley floor, offering a continuous view above the river corridor.

Lacking the drama of a ravine or gorge, the canyons are narrower than the broad valleys elsewhere along the corridor. While background is invisible, there is plenty to see in the middleground and foreground. The middle ground includes the colorful walls of the canyon and hillsides, the riparian corridor below and the mining operations scattered throughout. The foreground also includes colorful rocks, traffic, and small communities and buildings.

From Wadsworth to Pyramid Lake, the river stretches through plains and low rolling rills on the Pyramid Lake Indian Reservation. Upland vegetation in this reach is dominated by sagebrush scrub, punctuated by intermittent strands of cottonwood/willow riparian vegetation growing at the river's edge. Some of the floodplain includes irrigated pasture. Rural residential development is centered near the communities of Wadsworth and Nixon. The visual character is primarily that of open, arid rangeland. Dominating the view of the terminal point of the river is Pyramid Lake, a culturally and nationally significant landmark.

5.11.2 Environmental Consequences

Significance Criteria

Adverse effects on aesthetics were considered significant if implementation of an alternative plan would result in any of the following:

- Substantial changes to views of the Truckee River from existing view points including trails, over crossings, buildings, and residences.
- Substantial changes to views of other significant environmental resources such as mid-ground and background views of the overall landscape.
- Substantial changes to significant landmarks or defining features.
- Substantial obstruction of significant public views or view corridors.
- Development that is not harmonious with the surrounding visual setting (that is, introducing a form, line, color, or texture that contrasts with the visual setting).
- Features (form and color) that do not harmoniously blend the project into the project setting.

Changes to the landscape cannot be quantified, and there is not a point of demarcation where all individuals would agree a change has become significant. The quality of a landscape and changes to that quality can be perceived differently by individuals based on their familiarity, perceptions, and expectations for viewing scenery. The aesthetic assessment presented in the following text is based on expected reactions of residences and the general public to project-related changes to the aesthetic setting.

<u>Methodology</u>

The BLM's Visual Resource Assessment Procedure (VRAP) formed the basis of the effects assessment presented in this section. Although the VRAP was designed to evaluate aesthetic effects on an overall landscape basis, the procedures are useful in assessing effects to one element of the landscape, such as a river corridor.

According to the VRAP, there are four primary elements that produce the visual aesthetic (or scenic) aspects of a landscape that, when perceived, provide the viewer with a positive or negative response. These four elements reflect the form, line, color, and textural aspects of the landscape. The interplay, diversity, and complexity of these elements are what afford to the viewer the aesthetic quality

of the landscape. Typically, the greater diversity of landscape elements comprising a scene, the more pleasing the aesthetics of the landscape will be to the viewer.

Changes to these elements can improve or adversely affect the aesthetic quality of the landscape. It is possible to introduce elements by increasing diversity to improve scenic quality. It is also possible to introduce elements that contrast with the existing landscape that introduce form, line, color, or texture elements that are incongruous with the landscape. These types of changes can detract from the landscape aesthetics and can be perceived as displeasing to the viewer and therefore are considered as effects. The significance of the effect is dependent on the degree of change and permanence of the change. The significance is also dependent on the intrinsic aesthetics of the viewer, which vary for each person and cannot be measured.

For the project, the existing landscape elements for each reach were considered separately as part of the aesthetics evaluation, because each reach affords its own existing and distinct aesthetic elements. Because the project involves construction, aesthetic effects during construction were considered as short term. The effects analysis assumes that re-landscaping, restoration, and architectural design elements are part of the project that would reduce or eliminate aesthetic effects. Only those project activities that would permanently introduce a form, line, color, or texture element not present in the existing landscape or contrasting with the existing landscape, which also detracts from visual aesthetics, would be considered significant effects. Project activities that merely move or incorporate existing landscape features – such as moving an existing levee – would not be considered significant because that feature currently exists.

A second consideration for evaluating aesthetic effects is addressing the viewing point from where the effect can be observed. Viewpoints can be separated into foreground (zero to one-quarter mile to the project site), midground (one-quarter to 1 mile), and background (greater than 1 mile). Typically, changes to the foreground viewing are considered most significant because the greatest amount of detail can be observed from the foreground position. The aesthetic sensitivity can decrease when viewed from a greater distance from the project site because site details soften to the viewer. Because only large landscape changes are typically observed from the background position, only landscape-wide changes would be considered significant. However, because all of the project activities proposed can be observed primarily from foreground positions, construction activities would be considered temporarily significant and the evaluation for mid-ground and background unnecessary.

A third consideration for evaluating aesthetic effects is whether the project activity would result in a viewshed blockage; that is, would the project feature obstruct the current view from a roadway, trail, or building so that mid-ground and background would not longer be visible. Any permanent viewshed blockage would be considered significant.

A fourth consideration is length of time that an observer can view a landscape (aesthetic resource). Views from parks, trails, and vistas would be considered most sensitive, as would be mid- and background views from scenic highways. Aesthetic effects affecting views from the sensitive view locations would be considered significant. Views that are blocked by foreground features or foreground views from highway overpasses where views are only temporary would be considered less sensitive.

No Action Alternative

The No Action Alternative assumes that no action would be taken to provide flood protection along the study reaches of the Truckee River, Steamboat Creek, Truckee Meadows, and North Truckee Drain. Local and regional plans and ordinances would continue to be followed to preserve the natural function and scenic value of mountains, rivers, significant ridgelines, wetlands, aquifer recharge areas, and water bodies. Local and regional governments would continue to implement design guidelines to

maintain the desired aesthetic quality of neighborhoods and communities. Large stormwater flows would still have the potential to erode and overtop stream banks, uprooting trees and vegetation, and depositing a variety of flood-flow debris along and adjacent to the stream banks. Flood fighting actions, including placement of riprap and sand bags, could detract from the existing setting. Emergency measures to repair stream bank damage and levees could leave a patchwork of engineered features and inconsistent design elements that would conflict with the existing setting, thereby producing an adverse aesthetic effect. The degree, extent, and duration of the effects would depend on the magnitude of the flooding event and the timeframe for more permanent, if any, engineered flood risk management measures. Under the No Action Alternative, recreation components as envisioned in this project would not be implemented, and the beneficial results of the enhanced aesthetic quality of the river corridor would not be realized. Due to these variables, it is not possible to predict the actual significance of the No Action Alternative to the aesthetic resources of the Truckee River.

Alternative 3-Floodplain Terrace Plan

The Floodplain Terrace Plan would reduce damaging flood events in the Truckee Meadows reach. In addition, recreation features are proposed at various locations along the river.

Truckee Meadows Reach

Construction of the proposed flood risk management features would result in temporary direct and indirect visual effects during construction (construction equipment and activities). However, following construction, these features would generally be compatible with the existing visual character, as described in further detail below. Viewsheds for residents, visitors, and motorists could be directly and indirectly affected by construction of floodwalls, levees, and scour protection features within the project area, resulting in a significant effect. However, where new aesthetic features would represent a significant effect, mitigation measures would be implemented to lessen the effects of construction, and to incorporate design features and methods to avoid permanent adverse visual impacts.

This reach of the Truckee River exhibits a riparian vegetation corridor along the river banks, which affords a significant aesthetic feature to the river corridor (adding form, color, and texture). Any levee and floodwall construction or bank stabilization that would remove existing vegetation would affect the aesthetic value of the river corridor.

Levees and floodwalls could significantly reduce the aesthetic quality of the river corridor directly by introducing a form, line, and color that is inconsistent with the landscape features of the parkway corridor. The visual effect of the levees would depend on the manner on which the water-side slopes are completed. Levee slopes with only riprap would introduce a significant effect, compared with existing conditions, due to the form and color effect. Bank stabilization that incorporates bio-engineered bank protection could enhance the aesthetic setting by adding form, compatible color, and texture to the river bank. Levees and floodwalls could act as a view block, affecting views of the river parkway. Finally, an indirect effect to visual resources from construction of concrete floodwalls could be the the potential for significant adverse visual effect created by graffiti from graffiti vandals. Sealants would be incorporated into the design of proposed floodwalls and concrete structures to allow for effective removal of graffiti.

This reach is primarily visible from the recreation trail used by walkers and bikers. Other significant viewpoints of this reach include vehicle bridges as well as Mill Street. Levees and floodwalls within the Truckee Meadows reach would be designed with recreation trails on top so that the river corridor can be viewed by the recreating public, particularly for reaches where no access is currently available. Design elements that would create view blocks, particularly along the recreation trail and residential areas would be avoided to the extent possible. The avoidance and minimization measures

discussed above, in addition to the use of levee and floodwall maintenance roads for recreational purposes, would reduce the direct effect of levees and floodwalls on aesthetic resources in this reach to less-than-significant.

Construction of the floodplain terraces would involve removal of vegetation and excavation of soil. These actions would temporarily introduce form, line, and color effects through the loss of vegetation and exposure of soil that would represent short-term significant effects on the visual setting. With the implementation of environmentally sustainable design features, including revegetation of the terraces following construction, it is expected that following maturation of the riparian vegetation, the channel terracing would visually enhance the setting, improving aesthetic quality and be considered an overall beneficial effect. The channel terracing efforts would be primarily observed from the river bank recreation trail, the additional recreation trails proposed as part of this alternative's recreation component, Mill Street, Rock Boulevard, McCarran Boulevard, and all high use corridors.

The recreation features proposed for the Floodplain Terrace Plan in this reach are located within the footprint of the proposed flood risk management features. Recreation features in the Truckee Meadows reach include installation of picnic sites, group shelters, fishing sites, trails, a parking lot, restroom facilities, and a playground. Construction of the proposed recreation features would result in temporary visual effects during construction (construction equipment and activities). However, following construction, these features would generally be compatible with the existing visual character. Replacement of the recreation trail along this reach would not be expected to have significant aesthetic effects as long as the alignment of the trails allows for continued views of the river corridor. Alignment of the trail behind levees and/or floodwalls that block the view of the trail users would be considered a significant effect compared with existing conditions. Expansion of the trail system into the floodplain terraces would enhance the aesthetic experience of hikers and picnickers utilizing the recreation facilities and would increase access to the river, a central point of aesthetic value for this region.

Overall, effects to visual resources and aesthetic value in this reach would be considered less than significant as a result of this alternative.

Lower Truckee River Reach

There are no direct effects to aesthetic resources expected in the Lower Truckee River reach because the project does not propose features in this reach. Indirect effects from induced flows in this reach are not expected to occur because of the negligible change in depths, duration, and frequency for the higher chance occurrence flood events.

Alternative 2-Detention Plan

This alternative would reduce damaging flood events in the Truckee Meadows reach. In addition, recreation features are proposed at various locations along the river.

Truckee Meadows Reach

As described for the Floodplain Terrace Plan , construction of the proposed flood risk management features would result in temporary visual effects during construction (construction equipment and activities). However, following construction, these features would generally be compatible with the existing visual character. Where new aesthetic features would represent a significant effect, mitigation measures would be implemented to lessen the effects of construction, and to incorporate design features and methods to avoid permanent adverse visual impacts.

North Truckee Drain. Under existing conditions the North Truckee Drain is essentially a linear

stormwater channel with minimal aesthetic qualities. Under this alternative, the portion of the drain south of I-80 would be placed into an underground culvert. Other than the temporary visual (color contrast) during construction, no visual effect would be expected for this industrialized area of the project.

UNR Farms Detention Basin. Steamboat Creek affords local visual variety to residential areas in the Hidden Valley and Pembroke Drive area due to its meandering channel and emergent riparian vegetation. Construction of levees and floodwalls would alter the aesthetics of the stream and potentially lead to view blocks. The aesthetic effect to the local residents could be significant. This project feature would be located within the University of Nevada agricultural fields east of McCarran Blvd. Although the fields are typical of an agricultural and cattle lot setting, the aesthetics are enhanced by the Huffaker Hills in the background and the fields represent the last remaining agricultural fields immediately adjacent to the Reno-Sparks metropolitan area. Irrigation and cattle grazing practices enhance the seasonal views of this landscape from McCarran Blvd and from a residential community to the south. Any land use change that would affect the agricultural setting would be considered significant. Construction of detention basin levees (form and line effect) that would alter the land use patterns would significantly affect the aesthetics of the settings. Construction of levees along McCarran that would obstruct motorists' views of the agricultural land would be considered significant.

Steamboat Creek. This alternative includes floodwalls along Steamboat Creek as well as along Boynton Slough. Steamboat Creek, which flows through an incised channel, is not a distinctive visual feature of Truckee Meadows and can only be observed from foreground views. It is primarily viewed from residential areas that border the southern end of Truckee Meadows. Flood walls will add a distinctive visual feature to the area that will be evident from mid-ground views and potentially block the views of the local residences of the background setting. Floodwall visual effects are potentially significant depending on the degree of view blockage. Concrete floodwalls could also be the target of graffiti, introducing the potential for significant adverse visual effect created by the vivid colors typically used by graffiti artists.

Boynton Slough. Boynton Slough flows through a residential area east of McCarran Blvd and through essentially a stormwater channel west of McCarran. Construction of a floodwall through the residential stretch would introduce a significant visual effect. The wall would create a visual block preventing midground and background views of Truckee Meadows and surrounding mountain setting. The floodwall would also introduce a liner and form effect, potentially subject to graffiti damage.

Huffaker Detention Facility. The Huffaker Detention Facility would introduce a permanent linear and circular form into the low elevation area between the Huffaker Hills. This feature would be visible to local residences. During construction of the basin, removal of vegetation and earthwork would introduce a temporary, significant effect. Long-term effect would depend on revegetation efforts that would incorporate color elements of the surround landscape.

Lower Truckee River Reach

There are no direct effects to aesthetic resources expected in the Lower Truckee River reach because the project does not propose features in this reach. Indirect effects from induced flows in this reach are not expected to occur because of the negligible change in depths, duration, and frequency for the higher chance occurrence flood events.

5.11.3 Mitigation Measures

Alternative 3-Floodplain Terrace Plan and Alternative 2-Detention Plan

Mitigation measures that would reduce the effect to aesthetic resources of the project area due to

flood risk management and recreation elements are listed below:

- Incorporate form, line, color, and texture aspects of the existing landscape into the design of flood risk management elements to reduce the contrast effect.
- Incorporate elements of existing and historical design in the architecture of replacement bridges.
- Avoid straight line elements and incorporate the curving nature of the river into structural design.
- Avoid elements that would create view blocks, particularly along the recreation trail and residential areas.
- Incorporate bioengineered bank stabilization methods where possible and allow for vegetation to grow amongst bank stabilization materials.
- Design levees with recreation trails on top so that the river corridor can be viewed by the recreating public, particularly for reaches where no access is currently available.
- For floodwalls and concrete structures, incorporate sealants that allow for effective removal of graffiti.

5.12 TRAFFIC AND CIRCULATION

5.12.1 Affected Environment

The project area includes roadways in the following jurisdictions: County of Washoe; County of Storey; City of Reno; and City of Sparks. The Washoe County Regional Transportation Commission (RTC) serves as the area metropolitan planning organization for the region. Local municipalities determine their own criteria for streets and roads while the Nevada Department of Transportation oversees state and Federal highways. The project area is considered to be a combination of suburban, low density residential, and urban business/industrial land uses within the greater Reno-Sparks Metropolitan region. The existing transportation system in the project area includes roads, intersections, bus transit services and facilities, and bicycle and pedestrian facilities.

Bus transit service in the Reno and Sparks area is provided by the RTC. RTC/RIDE operated by Citifare is the main bus service provider within the area with thirty different routes. Currently, Storey County does not support mass transit service. Bicycle and pedestrian facilities exist throughout the project area of Reno and Sparks. There are several different types of facilities, which include shared use trails and urban bicycle/pedestrian streets.

Existing traffic volume data for the roads within the project area were obtained from a number of sources including: automatic traffic recorder and turning movement count data collected in June, 2007 by Sierra Traffic Services; and peak hour traffic volumes at the intersections of Center Street and 2nd Street and Center Street and Mill Street collected by Camp Dresser and McKee, Inc. in January, 2008. The existing traffic volumes were projected into the base year of 2015 using a growth rate of 2.5 percent. The following sections present the individual components of the transportation system in the project area.

Road System

This section describes the roads and intersections in the project area that were analyzed, the methodology used to conduct the analysis, and the results of the analysis.

<u>Roads</u>

This section describes the roads in the project area including their location, direction, functional

classification, access control, and adjacent land use. Any transportation services such as bus routes or bicycle routes that are provided by the road are also identified. The access control for each road was determined using the access management standards presented in Table 5-26.

Table 5-26. Access Management Standards–Arterials, Collectors, and Rural Highways.

Access Control	Posted Speed Limit	Signals per Mile	Median Type
High	45-55 mph	2 or less	Raised with channelization pockets.
Moderate	40-45 mph	3 or less	Raised or painted with turn pockets.
Low	35-40 mph	5 or less	Raised or painted with turn pockets or undivided with painted turn pockets or two-way, left-turn lane.
Ultra-low	30-35 mph	8 or less	Raised or painted with turn pockets or undivided with painted turn pockets or two-way, left-turn lane.

Source: *2035 Regional Transportation Plan*, Regional Transportation Commission of Washoe County, April 2005

Table 5-27 presents the significant characteristics (e.g., street names, locations, direction, functional classifications, access control, transit services, and adjacent land uses) for street segments located within the project area.

Freeways

This section describes the major access controlled freeways in the project area.

Interstate 80 (I-80) is the second longest highway in the United States, stretching from California to New Jersey. Within the project area it is a four and six lane limited access east-west freeway that provides access to local and interstate users. I-80 runs just north of downtown Reno and provides direct connections to Virginia Street (Business 395), Sierra Street, Wells Avenue, and McCarran Boulevard.

Interstate 580 (I-580) was recently completed to Carson City and is now dual posted as I-580/US 395.. The freeway connects Reno and Carson City, Nevada.

U.S. Highway 395 (Highway 395) is a north-south freeway which connects the northern and southern areas of Reno. It is currently the signed portion of the I-580/Highway 395 corridor. Highway 395 has a major system traffic interchange with I-80 and connects to other major roads in the downtown area.

Intersections

Of the 32 major intersections included in the 2010 traffic analysis for the Locally Developed Plan, analysis for the 11 that are in the current project area were brought forward for further evaluation and comparison with the current proposed alternatives. They are listed below in Table 5-28.

Table 5-27. Significant Characteristics of Street Segments Located within the Project area.

Street Name	Location	Direction	Functional Classification	Access Control	Transit Services	Adjacent Land Use
McCarran Boulevard	Virginia Street to I-80 in Reno and Sparks	Loop road	Principal arterial (four lanes, divided, between Rock Boulevard and East Greg Street; six lanes, divided, with a marked bicycle lane between East Greg Street and Glendale Avenue)	Varies from low to high	RTC/Citifare bus system, Route 54 between Capitol Boulevard and Mira Loma Drive.	Commercial and industrial
Rock Boulevard	McCarran Boulevard to I-80 in Reno and Sparks	North and south	Minor arterial (four lanes with a center turn lane, marked bicycle lanes, and no on-street parking)	Low	RTC/Citifare bus system, Route 14 between Mill Street and Capital Boulevard, Route 54 between Capital Boulevard and McCarran Boulevard; RTC bicycle route system between Mill Street and Longley Lane	Industrial and commercial with significant frontage with the RNO
Mill Street	Virginia Street to McCarran Boulevard Reno	East and west	Minor arterial (four lanes with a center turn lane, intermittent on-street parking)	Moderate	RTC/Citifare bus system, Route 14 between Lake Street and Corporate Lane, Route 14A between Lake Street and Greg Street; RTC bicycle route system between Virginia Street and Rock Boulevard	Residential, commercial, and industrial
Greg Street	Mill Street to I-80 in Reno and Sparks	East and west	Minor arterial (four lanes, divided, with a center turn lane between Rock Boulevard and Sparks Boulevard	Moderate	RTC/Citifare bus system, Route 18 between Franklin Way and Industrial Way, Route 18X between Kleppe Lane and Industrial Way	Commercial and industrial
Glendale Avenue	Highway 395 to McCarran Boulevard Sparks	East and west	Principal arterial (four lanes, divided, with a center turn lane)	Moderate	RTC/Citifare bus system, Route 18 between 2nd Street and Meredith Way, Route 18X between Industrial Way and Meredith Way;	Industrial and commercial
Plumb Lane	Arlington Avenue to Highway 395 in Reno	East and west	Minor arterial (four lanes, divided, with sidewalks)	Ultra low between Virginia Street and Plumas Street, moderate between Plumas Street and Arlington Avenue	RTC/Citifare bus system, Route 6 between Arlington Avenue and Plumas Street; RTC bicycle route system	Residential with limited retail

Table 5-28. Intersections Included in the Project Traffic Analysis.

Greg Street & Mill Street
Rock Boulevard & Glendale Avenue
Rock Boulevard & Greg Street
Rock Boulevard & Mill Street
Rock Boulevard & Longley Lane
McCarran Boulevard & Glendale Avenue
McCarran Boulevard & Greg Street
McCarran Boulevard & Mill Street
McCarran Boulevard & Rock Boulevard
McCarran Boulevard & Longley Lane
Sparks Boulevard & Greg Street

Transit Facilities and Services

Bus transit service in the cities of Reno and Sparks is provided by the RTC. RTC/RIDE, operated by Citifare, is the main bus service provider within the area with 30 different routes. A description of existing bus routes on project area roadways is provided below.

Route Rapid/Rapid Connect (R/RC) — Virginia Street

Route R/RC runs from the RTC Citicenter to the Meadowood Mall. The route begins south on Lake Street over the Truckee River, continues south to the mall on Virginia Street, and then loops back to the RTC Citicenter on Virginia Street, crossing the Truckee River on Center Street. This route primarily serves the Downtown Reno reach of the project.

Route 14 —Mill Street

Route 14 runs from the RTC Citicenter to Rock Boulevard and the Longley Lane area. The route crosses the Truckee River on Lake Street and continues east and west along Mill Street. Although the route emanates from the RTC Citicenter (located in the Downtown Reno reach), it primarily serves the Truckee Meadows reach of the project.

RTC SIERRA SPIRIT

RTC provides free transportation service daily (from 7:00 a.m. to 9:00 p.m.) to the UNR, on the RTC SIERRA SPIRIT. Buses depart the University approximately every 15 minutes and the route follows Virginia Street to First Street to Arlington Avenue to Liberty Street and returns to the University on Virginia Street.

RTC INTERCITY

RTC also provides transportation between Reno and Carson City (located approximately 30 miles south of Reno) on the RTC INTERCITY route. The service leaves Reno from the RTC Citicenter Station.

Bicycle and Pedestrian Facilities

Bicycle and pedestrian facilities are located throughout the cities of Reno and Sparks. There are several different types of facilities, including shared use trails and urban bicycle and pedestrian streets. According to the *2007 City of Reno Master Plan*, new bicycle lanes (Class II trails), bicycle routes (Class III trails) and neighborhood connector paths will be constructed in the future.

Shared-Use Trails

Also known as Class I trails, shared-use trails offer a separate right-of-way for the exclusive use

by bicyclists and pedestrians. There is a shared-use trail within the project area. It begins at the south side of the Truckee River near the Lake Street Bridge. The path runs to the east along the south side of the river until it crosses to the north side of the river via a pedestrian bridge between Wells Avenue and Highway 395. The trail then runs to the east along the north side of the river for the remainder of the project area.

Urban Bicycle and Pedestrian Streets

Urban bicycle and pedestrian streets are streets that include bicycle lanes, sidewalks with landscape buffers, curb extensions, bus shelters, benches, posted maps, and trash receptacles. According to the *2007 City of Reno Master Plan*, Fourth Street, California Street, Virginia Street and Wells Avenue are currently urban bicycle and pedestrian streets.

5.12.2 Environmental Consequences

This section identifies and evaluates the potential effect of the proposed alternatives on the traffic and circulation in the project area. There would be no long-term or permanent traffic volume increases expected as a result of the project. Therefore, any incremental transportation effects associated with the project would be limited to the proposed construction years.

Analysis Methodology

The evaluation of transportation system effects associated with any project focuses on comparing the existing or projected traffic volumes to the existing or anticipated capacity of the transportation system. For a roadway project, this analysis is typically performed for the horizon year. However, as the effects of this project on the roadway system are only expected during construction, this analysis focuses solely on the construction-related effects that result from additional traffic created by construction activities and the diversion of traffic resulting from temporary changes to the existing roadway network.

The analysis uses methodology found in the Highway Capacity Manual (HCM) (Transportation Research Board, 2000) and results in level of service (LOS) and volume-to-capacity ratios. The concept of LOS is defined as a qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. The LOS definition provides an index to quality of traffic operation in terms of speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six LOS ratings are defined for each type of facility. The rating system uses letters from A to F, with LOS A representing the best operating conditions and LOS F, the worst. Since the LOS of a traffic facility is a function of the traffic flows, a facility may perform at a wide range of LOS ratings depending on the time of day, day of week, or period of year.

A description of the operating conditions for each LOS is provided below:

- LOS A describes conditions with little to no delay to motorists.
- LOS B represents a desirable level with relatively low delay to motorists.
- LOS C describes conditions with average delays to motorists.
- LOS D describes operations where the influence of congestion becomes more noticeable. Delays are still within an acceptable range.
- LOS E represents operating conditions with high delays. This level is considered by many agencies to be the limit of acceptable delay.

- LOS F is considered to be unacceptable to most drivers with high delays that often occur when arrival flow rates exceed the capacity of the intersection.

Roads

A segment-based analysis was not performed as segment analyses are typically used at the planning level or for segments over longer distances than the ones impacted by this project. In an urban setting, the operations at signalized intersections will control the overall operations of the segments that connect them.

Intersections

LOS ratings for unsignalized intersections are calculated using the operational analysis methodology of the HCM. The procedure accounts for lane configuration on both the minor and major street approaches, conflicting traffic stream volumes, and the type of intersection control (STOP, YIELD, or all-way STOP control). The definition of LOS for unsignalized intersections is a function of average control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The LOS criteria for unsignalized intersections are shown in Table 5-29.

LOS ratings for signalized intersections are also calculated using the operational analysis methodology of the HCM. The methodology for signalized intersections assesses the effects of signal type, timing, phasing, vehicle progression, vehicle mix; and geometry on average control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Table 5-29 summarizes the relationship between LOS and average control delay for signalized intersections.

Table 5-29. LOS Criteria for Intersections.

Level of Service	**Unsignalized Intersection Criteria** Average Control Delay (Seconds per Vehicle)	**Signalized Intersection Criteria** Average Control Delay (Seconds per Vehicle)
A	≤10	≤10
B	>10 and ≤15	>10 and ≤20
C	>15 and ≤25	>20 and ≤35
D	>25 and ≤35	>35 and ≤55
E	>35 and ≤50	>55 and ≤80
F	>50	>80
Source: *Highway Capacity Manual 2000*, Transportation Research Board, 2000, pages 16-2 and 17-2.		

For signalized intersections, this delay criterion may be applied in assigning LOS designations to individual lane groups, to individual intersection approaches, or to the entire intersection. It is summarized in this analysis as the LOS of the overall intersection.

For unsignalized intersections, this delay criterion may be applied in assigning LOS designations to individual lane groups or to individual intersection approaches. The overall intersection LOS is defined as the LOS of the worst approach.

As illustrated in Table 5-29, a good LOS consists of minimal delays, while a poor LOS consists of extended delays. Delays can be correlated to the ratio between traffic volume and capacity. For example if the volume of traffic approaching an intersection is near capacity for that volume of traffic, the end result is a poor LOS. Conversely, if the volume of traffic approaching an intersection is significantly

less than the capacity, the end result is a good LOS. An intersection with an approach volume that exceeds the capacity results in significant amounts of delay and queuing that will lead to traffic diverting to different routes and seeking cut-through paths through neighborhoods or other alternate routes leading to effects across the entire network.

Evaluation of the intersections within the project area was performed using Synchro 7, a widely used traffic analysis tool that can evaluate intersection delays and congestion using HCM methodology.

Construction Period

Construction of the project would occur from 2015 to 2018. Therefore, transportation effects associated with the project are evaluated on a daily basis for each year of construction as well as an hourly basis based on the following criteria:

- Material hauling activity would occur during normal work hours, from 7 a.m. to 5 p.m.
- Equipment hauling activity would occur during normal work hours, from 7 a.m. to 5 p.m.
- Worker shifts would operate from 7 a.m. to 5 p.m.

Construction-Related Trip Generation

Expected traffic volume increases associated with a development project are typically determined using the Institute of Transportation Engineers Trip Generation Manual, 7th Edition land use trip generation rates. However, there are no empirical data sources in the Manual related to construction activities. Alternatively, projects will typically collect local data to develop empirical data representative of the proposed development project. However, the project does not have empirical data sources available to determine the expected traffic volume increases due to construction activities. Therefore, calculations have been prepared to determine the number of construction vehicles required for each phase of construction to deliver materials, equipment, and labor forces to each construction site. The construction vehicles required for each work site are illustrated in the Traffic Technical Report prepared by HDR/CDM for the project (HDR/CDM, 2011b).

Construction-Related Trip Distribution

Distributing the construction material, equipment and labor force trips throughout the project area roadway network is a complex task and one that employs thorough knowledge of the project area and features. The following describes how the expected trips generated by the project would be distributed and assigned to the project area roadway network.

It is assumed that all of the construction vehicles and labor force vehicles would use I-80 as their point of origin. Table 5-30 presents the anticipated route that would be followed to access each facility based on the individual improvements expected as part of Alternative 3. Where multiple routes are listed, it is assumed that traffic utilizing each route was distributed evenly.

Table 5-31 presents the anticipated route that would be followed to access each facility based on the individual improvements expected as part of Alternative 2. Where multiple routes are listed, it is assumed that traffic utilizing each route was distributed evenly.

Feasible detour routes for the McCarran Boulevard bridge lengthening for the Detention Plan do not exist; therefore, construction activities would require that half of the bridge be shut down at a time, thus reducing the number of available travel lanes across the bridge from 4 lanes to 2 lanes (reduced to one lane in each direction).

Table 5-30. Truck and Worker Routes (Alternative 3-Floodplain Terrace Plan [a]).

Construction Year	Project Features	Routing
2015	North Truckee Drain	I-80 to McCarran
2015-2016	Vista to Highway 395 (scour protection)	I-80 to McCarran, I-80 to Sparks
2016-2017	Vista to McCarran (levees/floodwalls/interior drainage/scour protection/Channel terracing)	I-80 to McCarran, I-80 to Sparks
2017	McCarran to Rock (floodplain terracing/levees/floodwalls/interior drainage)	I-80 to McCarran
2018	Rock Boulevard to Highway 395 (levees, floodwalls, and relocations),	I-80 to Rock, Highway 395 to 2nd
2018-2019	Revegetation of new terrace, Vista to McCarran Boulevard	I-80 to McCarran, I-80 to Rock
2018-2019	Revegetation of new terrace, McCarran Boulevard to Rock Boulevard	I-80 to Rock, Highway 395 to 2nd
2019	Recreation, Vista to Highway 395	I-80 to McCarran, I-80 to Sparks

[a]Note: Project features and schedule are based on a larger Floodplain Terrace Plan that was evaluated in 2010 in the Traffic Technical Report prepared by HDR/CDM. However, the information compiled for the Truckee Meadows reach was still considered useful in scaling the analysis down to the current proposed Floodplain Terrace Plan alternative.

Table 5-31. Truck and Worker Routes (Alternative 2-Detention Plan)

Construction Year	Project Features	Routing
2015	North Truckee Drain Realignment	I-80 to McCarran
2015	McCarran Blvd. Bridge Extension	I-80 to McCarran
2016	Clean Water Way Relocation	I-80 to McCarran
2016	Vista to McCarran Levee & Floodwall	I-80 to McCarran, I-80 to Sparks
2017	McCarran to Rock Blvd Levee & Floodwall	I-80 to Rock, I-80 to McCarran
2018	Bank Stabilization Rock Blvd to 395	I-80 to Rock, 395 to 2nd
2018	Rock Blvd to 395 Levee & Floodwall	I-80 to Rock, 395 to 2nd
2019	Steamboat Creek Floodwall	I-80 to McCarran to Mira Loma
2020	Huffaker Detention Facility	I-80 to McCarran

Significance Criteria

Adverse effects on traffic and circulation were considered significant if implementation of an alternative plan would result in a decrease in LOS to ‘E’ or worse, thus substantially causing congestion or delays in traffic movement and circulation. Mitigation measures would be required whenever the effects of the project exceed the thresholds shown in Table 5-32. In cases where the existing LOS at an intersection is already LOS ‘E’ or ‘F’, mitigation measures would automatically be considered if construction traffic would utilize that intersection.

Adverse effects on parking were considered significant if displacement of existing parking would substantially affect the availability of parking in an adjacent residential area, including the availability of public parking or parking deficiency would severely impede the accessibility of a public facility, such as a park or beach.

Table 5-32. Local and Regional LOS Standards and Mitigation Thresholds.

Standards	Mitigation Thresholds
• LOS 'C' – All regional roadway facilities outside the McCarran Boulevard ring	Mitigation of project effects should intersection LOS degrade to LOS 'E' or worse due to construction.
• LOS 'D' – All regional roadway facilities inside the McCarran Boulevard ring – All freeways and ramps – Longley Lane – Double R Boulevard to South McCarran Boulevard	Mitigation of project effects should intersection LOS degrade to LOS 'E' or worse due to construction.
• LOS 'E' – McCarran Boulevard – entire length – Mill Street – Terminal Way to Ryland Avenue – Intersection of Mill Street and Kietzke Lane – Terminal Way – Villanova Drive to Mill Street – I-80 westbound on-ramp from Rock Boulevard	Mitigation of project effects should intersection LOS degrade to LOS 'E' or worse due to construction.
• LOS 'F' – Plumas Street – Plumb Lane to California Avenue – Rock Boulevard – Glendale Avenue to Victorian Avenue	Mitigation of project effects should intersection LOS degrade to LOS 'E' or worse due to construction.
Source: 2030 Regional Transportation Plan, Regional Transportation Commission of Washoe County, April 2005	

No Action Alternative

Under the No Action Alternative, no Federally funded flood risk management improvements would be implemented in the project area. Local, regional, and state governments and agencies would continue to monitor roadway and traffic circulation conditions, pursuing improvements throughout the project area when conditions drop below acceptable level of service conditions. Local roadways near the Truckee River would continue to experience localized flooding and closures during high water conditions in the river.

Tables 5-33 and 5-34 present the LOS for the major intersections based on AM and PM peak traffic volumes during the anticipated construction years under the No Action condition. Detailed Synchro reports for each intersection are included in Traffic Technical Report prepared by HDR/CDM for the project (HDR/CDM, 2011b).

Alternative 3-Floodplain Terrace Plan

An analysis of current and future traffic and circulation conditions was carried out on a much larger Floodplain Terrace Plan in 2011 (HDR/CDM, 2011b). That analysis also considered potential project features beyond the current extent of the project area. However, the information compiled for the Truckee Meadows and Lower Truckee River reaches was still considered useful in scaling the analysis down to the current proposed alternative. The following discussion on traffic and circulation conditions draws from that analysis and compares potential changes to traffic and circulation as a result of the current project alternative to the results of the 2011 analysis. Where necessary, clarification is made regarding difference in scale between the 2011 project scope assumptions and the current alternative being considered.

Table 5-33. Intersection Levels of Service, AM Peak Hours.

Year	2014		2015		2016		2017		2018	
Name	v/c	LOS	v/c	LOS	v/c	LOS	v/c	LOS	v/c	LOS
Mill Street & Greg Street	0.81	D	0.83	D	0.85	D	0.87	D	0.9	E
Mill Street & South McCarran Boulevard	1.06	D	1.08	D	1.11	E	1.13	E	1.16	E
S Rock Road & South McCarran Boulevard	0.76	C	0.78	C	0.8	C	0.83	C	0.86	C
Glendale Avenue & South Rock Boulevard	0.88	D	0.9	D	0.92	D	0.94	D	0.96	E
Mill Street & South Rock Boulevard	0.76	D	0.78	D	0.79	D	0.81	D	0.83	E
S Rock Road & Longley Lane	1.01	C	1.04	C	1.06	D	1.09	D	1.12	D
South McCarran Boulevard & Longley Lane	1.09	E	1.11	F	1.14	F	1.17	F	1.15	F
Greg Street & South Rock Boulevard	0.74	D	0.75	D	0.77	D	0.79	D	0.81	D
East Greg Street & South McCarran Boulevard	0.94	E	0.96	E	0.98	E	1	E	1.02	E
East Greg Street & Sparks Blvd	1.68	F	1.72	F	1.77	F	1.82	F	1.86	F

Table 5-34. Intersection Levels of Service, PM Peak Hours.

Year	2014		2015		2016		2017		2018	
Name	v/c	LOS	v/c	LOS	v/c	LOS	v/c	LOS	v/c	LOS
Mill Street & Greg Street	1.12	E	1.15	F	1.18	F	1.21	F	1.24	F
Mill Street & South McCarran Boulevard	1.17	E	1.2	E	1.23	E	1.25	F	1.28	F
S Rock Road & South McCarran Boulevard	1.02	E	1.05	F	1.07	F	1.09	F	1.12	F
Glendale Avenue & South Rock Boulevard	0.96	E	0.98	E	1.01	F	1.03	F	1.05	F
Mill Street & South Rock Boulevard	0.77	D	0.78	D	0.8	D	0.82	E	0.83	E
S Rock Road & Longley Lane	0.8	B	0.83	B	0.85	B	0.88	B	0.91	C
South McCarran Boulevard & Longley Lane	1.06	F	1.09	F	1.11	F	1.13	F	1.16	F
Greg Street & South Rock Boulevard	0.97	F	0.99	F	1.01	F	1.03	F	1.05	F
East Greg Street & South McCarran Boulevard	1.28	F	1.31	F	1.35	F	1.44	F	1.48	F
East Greg Street & Sparks Blvd	0.86	D	0.88	E	0.9	E	0.92	E	0.94	E

In general, the difference in the 2011 Floodplain Terrace Plan features in the Truckee Meadows was the inclusion of an extensive ecosystem restoration plan that included extending floodplain terraces downstream of McCarran Boulevard to Steamboat Creek, terracing within the Vista Narrows, and a larger recreation plan. The 2011 plan also included extensive ecosystem restoration in the Lower Truckee River reach in addition to approximately 11 miles of scour protection in the Lower Truckee River reach.

Truckee Meadows Reach

The primary flood risk management features in the Truckee Meadows reach for the Floodplain Terrace Plan are setback levees, floodwalls, and floodplain terracing, which would reduce the chance of occurrence of a damaging flood event to 2% in the Truckee Meadows reach.

As discussed above, the traffic and circulation analysis carried out in 2011 was based on a larger plan with more and larger flood risk management and recreation features in addition to having an extensive ecosystem restoration plan associated with it. The results of the 2011 analysis are shown in Table 5-35 and Table 5-36.

The tables show the intersections that would have expected decreases in LOS during the AM peak hours and the PM peak hours The construction sequence of the current Floodplain Terrace Plan

features in the Truckee Meadows reach would follow the same general schedule as what was proposed in the 2011 plan. The major difference is no floodplain terracing is proposed between Vista to McCarran Boulevard in 2015-2016 for the current plan.

Table 5-35. Projected LOS Levels in the Truckee Meadows Reach Under Alternative 3 (2011 Plan) During the AM Peak Hours.

Intersection	2014		2015		2016		2017		2018	
	Base	Alt. 3	Base	Alt. 3	Base	Alt. 3	Base	Alt. 3	Base	Alt. 3
Mill Street & Greg Street	D	D	D	D	D	D	D (0.87)	**E (0.89)**	E	E
Glendale Avenue & South Rock Boulevard	D	D	D	D	D	D	D	**E**	E	E
East Greg Street & Sparks Blvd	F (1.68)	**F (1.74)**	F (1.72)	**F (1.83)**	F (1.77)	**F (1.85)**	F (1.82)	**F (1.82)**	F (1.86)	**F (1.86)**

Table 5-36. Projected LOS Levels in the Truckee Meadows Reach Under Alternative 3 (2011 Plan) During the PM Peak Hours.

Intersection	2014		2015		2016		2017		2018	
	Base	Alt. 3	Base	Alt. 3	Base	Alt. 3	Base	Alt. 3	Base	Alt. 3
East Glendale Avenue & South McCarran	F (1.07)	**F (1.08)**	F (1.11)	**F (1.12)**	F (1.14)	**F (1.15)**	F	F	F	F
Mill Street & Greg Street	E	E	F	F	F	F	F (1.21)	**F (1.25)**	F (1.24)	**F (1.28)**
Mill Street & South McCarran Boulevard	E	E	E	E	E	E	F (1.25)	**F (1.26)**	F	F
Glendale Avenue & South Rock Boulevard	E	E	E	E	F	F	F (1.03)	**F (1.04)**	F	F
Greg Street & South Rock Boulevard	F	F	F	F	F	F	F (1.03)	**F (1.05)**	F (1.05)	**F (1.06)**
East Greg Street & South McCarran Boulevard	F	F	F (1.31)	**F (1.37)**	F (1.35)	**F (1.41)**	F	F	F	F
East Greg Street & Sparks Blvd	D	**E**	E	E	E	E	E	E	E	E

However, both construction sequences have construction beginning downstream then working upstream, which is reflected in the shift of traffic pressure from the east Sparks intersections in 2014 through 2016, to west Sparks intersections during 2017 and 2018. Even with the reduced size of the current the Floodplain Terrace Plan , it is still expected that implementation of the Floodplain Terrace Plan would result in significant short-term construction-related affects to traffic intersections shown in the table above.

The proposed flood risk management features, including the levee and floodwall construction, would require the temporary closure of roadways in the Truckee Meadows reach, which would require detours. Road closures would have an indirect effect on traffic flow on neighboring roadways. Road closures and detour routes would be coordinated with local transportation and public works agencies to minimize the effects to traffic and circulation during construction.

In addition to coordination with the responsible transporation agencies, appropriate mitigation measures as identified in section 5.12.3 Mitigation Measures would be implemented to ensure that the effects to traffic and circulation resulting from construction of the proposed flood risk management features in this reach would be less than significant.

Construction of the proposed recreational features would result in increased traffic volumes along

roadways within the in the Truckee Meadows reach. However, construction traffic would be temporary and would be operating away from urbanized areas and within the construction areas to the extent possible. Therefore, there would be less-than-significant direct and indirect effects to traffic resulting from construction of the proposed recreational features in this reach.

Transit Facilities and Services. Under the Floodplain Terrace Plan , RTC Bus Route 14 along Mill Street would be detoured during construction (2014) onto 2nd Street to either High Street or Wells Avenue and would then connect back with Mill Street. However, effects to transit facilities and services in this reach would be short-term and less than significant because decreases to LOS E or worse would be managed through implementation of transportation management plan measures outlined in Section 5.12.3 Mitigation Measures.

Emergency Services. Under this alternative, routes taken by emergency vehicles, whether it is police cars, fire trucks, or ambulances, would be affected by construction traffic. These vehicles would be forced to follow the same detours as regular traffic during bridge closures and would experience the same expected delays. Effects to emergency services would be minimized by implementation of the mitigation measures below, including direct coordination with local fire and law enforcement departments. Direct and indirect effects to emergency services in this reach would be short-term and less than significant with implementation of the mitigation measures discussed below.

Parking. Certain construction activities could take up parking spaces with equipment and may have a temporary direct and indirect effect on the availability of on street parking. Any off street parking is expected to remain unchanged. However, the Contractor will keep as much on street parking available as possible during construction activities and to reopen the parking spaces when construction has finished. Because construction activities are not expected to affect many parking spaces and effects to parking would be short-term, they are considered less than significant.

Lower Truckee River Reach

There are no short- or long-term direct or indirect effects to traffic and circulation anticipated in this reach from this plan.

Alternative 2-Detention Plan

The Detention Plan would have traffic and circulation effects similar to those described for the Floodplain Terrace Plan . This alternative would result in traffic effects, as summarized below.

Truckee Meadows Reach

The following LOS changes at key intersections are forecast for the Detention Plan .

- 2011 - Sparks & Greg AM v/c increase from 1.69 to 1.83, PM LOS degrade from D to E and v/c increase from 0.87 to 1.08
- 2012 - Sparks & Greg AM v/c increase from 1.64 to 1.88, PM LOS degrade from D to F and v/c increase from 0.92 to 1.13
- 2013 - Sparks & Greg AM v/c increase from 1.78 to 1.93, PM LOS degrade from D to F and increase v/c from 0.96 to 1.19
- 2014 - McCarran & Mill AM LOS degrade from D to E and v/c increase from 1.05 to 1.09, PM v/c increase from 1.19 to 1.22

Also affected are the roadway segments of McCarran Boulevard, between Greg Street and Mill Street in 2010 due to bridge work over the Truckee River. The A.M. peak hour traffic across the McCarran Bridge would be expected to degrade from LOS B to LOS F with the reduction from four lanes of traffic to two lanes for this alternative. The P.M. peak hour would be expected to degrade from LOS B to LOS F for the southbound traffic and LOS D to LOS F for the northbound traffic. Effects to transit facilities and services, emergency services, and parking would be short-term and less than significant.

Lower Truckee River Reach

Due to no construction taking place in this reach there are no short- or long-term direct or indirect effects to traffic and circulation anticipated in this reach from this plan.

5.12.3 Mitigation Measures

Alternative 3-Floodplain Terrace Plan and Alternative 2-Detention Plan

The following general mitigation measures would be included in the transportation management plan and would be implemented under both alternatives. They are anticipated to reduce effects to less than significant levels.

- Any surface damage to local roads used for construction haul routes would be repaired to pre-construction conditions. The determination of pre-construction conditions is at the discretion of the lead agency in consultation with regional and local transit authorities.
- Hour restrictions for haul trucks would be implemented.
- Transportation Demand Management measures would include the following:
  - Provide employee incentives for carpooling.
  - Identify off-site parking areas where shuttles can arrive to pick up employees headed into the construction staging site.
  - Provide resources for marketing to encourage alternative modes to driving to work for residents or other employees not associated with the project
- High collision intersections would be identified to construction drivers. Drivers would be informed and trained on the various types of haul routes, which areas are more sensitive (i.e., high level of residential, education centers, and/ or narrow roadways). Drivers would attend sessions once a year. Drivers would not be allowed to detour on adjacent streets. Finally, success would be measurable and employees demonstrating good driving records would be rewarded.
- A public information campaign (including use of street banners, flyers, commercials, etc.) would be used to inform the general public of the haul routes and encourage use of alternative roadways by residents of the area. Detour closures would be heavily promoted for drivers and businesses in the project area to make sure motorists are aware of which alternate routes to use.
- Bike lanes and routes would be temporarily relocated to add capacity and improve safety if such concerns arise based on further peak hour analysis. The general public would be provided information about bike lane and route changes through the normal community information channels provided by the project.
- Street parking, where useful, would be temporarily restricted during the years of construction during peak hours only. This would potentially provide extra street width thereby enhancing capacity and traffic flow.

5.13 AIR QUALITY

A detailed assessment of the existing air quality condition in the project area in addition to an analysis of potential effects to air quality resulting from construction of project features is detailed in an Air Quality Technical Report prepared by HDR/CDM for this project (HDR/CDM, 2011a), and included in Appendix G. Results of this analysis are discussed below. No long-term effects to air quality are expected as a result of this project.

5.13.1 Affected Environment

This section discusses aspects of air quality that could potentially be affected by the Truckee Meadows Flood Control Project. This section provides the regulatory setting and standards, existing air quality, and air pollutant sources in the project area. The regulatory setting is described in terms of the Federal requirements. The environmental setting is described in terms of climate and atmospheric conditions, and air pollutant sources and existing concentrations. This section focuses on the existing air quality in Washoe County because Sierra County in California, Storey County and the PLPT Lands in Nevada are classified as attainment for all criteria pollutants. Therefore, although the air quality analysis evaluates the existing conditions and air emissions from project construction activities in the project area, it focuses on Washoe County.

Regulatory Setting

Air quality management and protection responsibilities exist in Federal, state, and local levels of government. The primary statute that establishes ambient air quality standards and establishes regulatory authorities to enforce regulations designed to attain those standards is the Federal Clean Air Act (CAA).

National Ambient Air Quality Standards

As required by the Federal CAA, the USEPA has established and continues to update the National Ambient Air Quality Standards (NAAQS) for specific "criteria" air pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), inhalable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and lead (Pb). The NAAQS for these pollutants are listed in Table 5-37, and represent the levels of air quality deemed necessary by USEPA, to protect the public health and welfare with an adequate margin of safety.

Over the past five years, the USEPA has implemented numerous changes to the NAAQS, including the new standards for 8-hour O_3 and $PM_{2.5}$ (24-hour and annual) and a new rolling 3-month average for lead. Additionally, USEPA has revoked the 1-hour O_3 and annual PM_{10} NAAQS. The USEPA also adopted a more stringent 24-hour $PM_{2.5}$ standard, of 35 $\mu g/m^3$ and a more stringent 8-hour O_3 standard of 0.075 ppm.

The Federal CAA requires states to classify air basins (or portions thereof) as either "attainment" or "non-attainment" with respect to criteria air pollutants, based on whether the NAAQS have been achieved, and to prepare air quality plans containing emission reduction strategies for those areas designated as "non-attainment." The portion of Washoe County that is located within Hydrographic Area 87 – Truckee Meadows, shown on Figure 5-7 is designated as a "serious" non-attainment area (NAA) for the 24-hour PM_{10}. A summary of the attainment status for all criteria pollutants is presented in Table 5-38. The remaining areas of Washoe County, all of Storey County, and the Pyramid Lake Paiute Indian lands are classified as attainment for all criteria pollutants.

State Implementation Plans

Counties or regions that are designated as Federal NAAs for one or more criteria air pollutants must prepare a State Implementation Plan (SIP) that demonstrates how the area will achieve attainment of the standards by the Federally mandated deadlines. In addition, those areas that have been redesignated from non-attainment to attainment are required to have a maintenance plan that shows how the area will maintain the standard for up to 10 years. Such areas, referred to as maintenance areas, are often treated similar to nonattainment areas for evaluation and conformity purposes. Because Hydrographic Area 87 – Truckee Meadows is located within Washoe County and is designated serious nonattainment for PM_{10}, Washoe County has to prepare an SIP.

Table 5-37. National Ambient Air Quality Standards.

Pollutant	Averaging Period Time	Standard, as parts per million by volume (ppmv)	Standard, as micrograms per cubic meter (μg/m^3)
Ozone (O_3)	8 -hour (1997 standard)s	0.08[a]	157
	8-hour (2008 standard)	0.075[a]	147
Carbon monoxide (CO)	8- hours	9	10,000
	1- hour	35	40,000
Nitrogen dioxide (NO_2)	Annual	0.053	100
Sulfur dioxide (SO_2)	Annual	0.03	80
	24- hours	0.14	365
	3- hours	0.5	1,300
Inhalable particulate matter (PM_{10})	Annual	N/A	50[b]
Particulate matter (PM_{10})	24- hours	N/A	150
Fine particulate matter ($PM_{2.5}$)	Annual	N/A	15
	24- hours	N/A	65 / 35[c]
Lead (Pb)	Rolling 3-month average (2008 standard)	N/A	0.15
	Quarterly	N/A	1.5

[a] based on a 3-year average of the 4th highest concentration
[b]Revoked by USEPA, effective on Dec. 18, 2006.
[c]Lower standard (35 μg/m^3) adopted by USEPA, effective on December 18, 2006
Sources: 40 CFR Part 50; and 71 FR 61144.

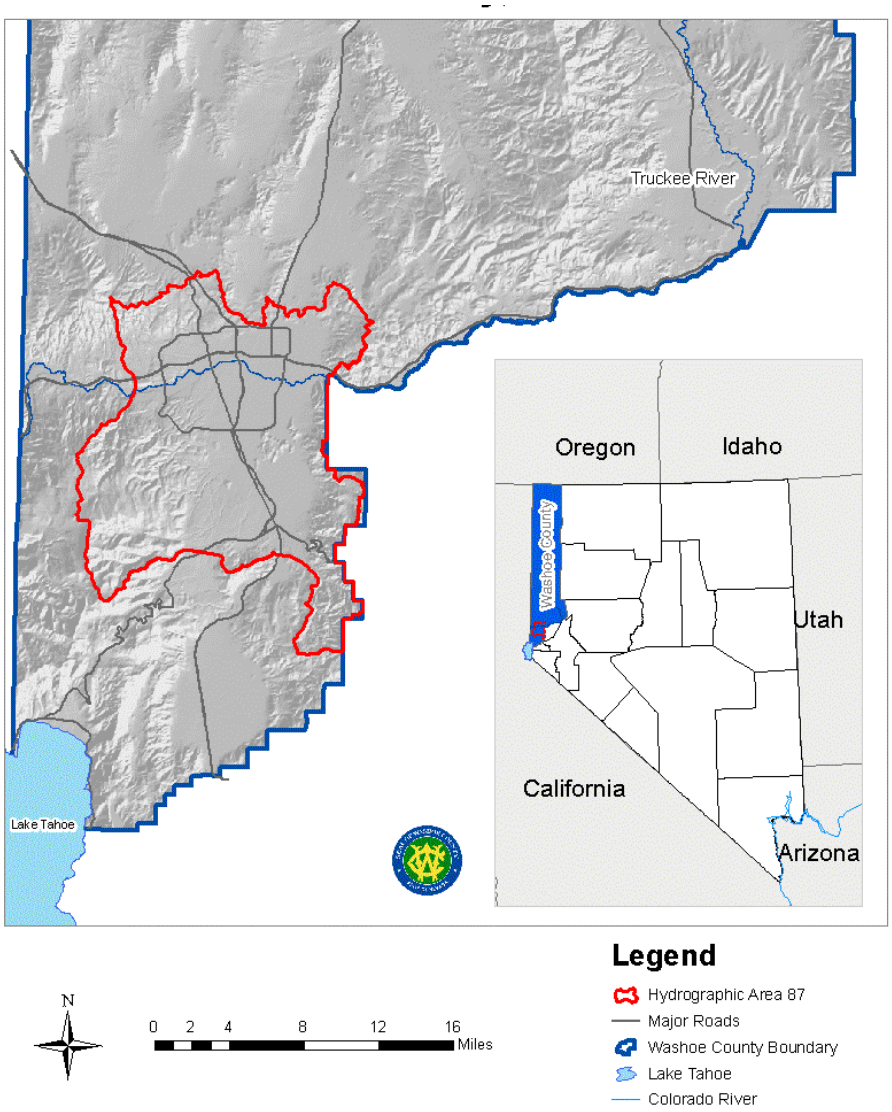


Figure 5-7. Hydrographic Area 87 – Truckee Meadows.

Table 5-38. NAAQS Attainment Status-Hydrographic Area 87 (Truckee Meadows).

Pollutant	Federal Status
O_3	Attainment, Maintenance
PM_{10}	Nonattainment, Serious
$PM_{2.5}$	Attainment
CO	Attainment, Maintenance
NO_2	Attainment
SO_2	Attainment
Pb	Attainment
Source: USEPA, 2010b.	

The Truckee Meadows PM_{10} NAA was originally designated as a moderate NAA. On February

7, 2001, the Truckee Meadows area was redesignated a serious PM_{10} NAA due to exceedances of the 24-hour NAAQS on January 6, 1999 as well as the annual NAAQS for 1999. On July 13, 2009, the Washoe County Air Quality Management Division (WCAQMD) submitted a redesignation request for PM_{10} to attainment status, and it is awaiting final approval (Washoe County, 2010a).

Washoe County was designated a marginal 1-hour O_3 NAA until June 5, 1998, when the USEPA revoked the 1-hour O_3 NAAQS for this area and reclassified Washoe County as an attainment area (AA). On December 20, 2000, the USEPA reinstated the 1-hour O_3 NAAQS because the proposed 8-hour NAAQS had been challenged in a U.S. Supreme Court case. On June 15, 2004, the USEPA rescinded the 1-hour O_3 standard and the 8-hour standard became effective on June 15, 2005. However, because the Truckee Meadows area had not attained the 1-hour standard when that standard was revoked, a maintenance plan for ozone was required under the implementation rules for the 8-hour O_3 NAAQS. Therefore, Washoe County must still submit an 8-hour maintenance plan for the new 8-hour standard, even though Washoe County is in attainment for the 8-hour standard. Washoe County has not exceeded the 8-hour O_3 NAAQS since the new 8-hour standard took effect in June 2005 (Washoe County, 2010a).

The CO NAA was classified as a moderate (< 12.7 ppm) NAA until 2005. In September 2005, the WCAQMD submitted a redesignation request to attainment/maintenance status for CO. The USEPA approved the redesignation request effective August 4, 2008.

General Conformity

Section 176(c) of the Clean Air Act (42 USC 7506[c]) requires any entity of the Federal Government that engages in, supports, or in any way provides financial support for, licenses or permits, or approves any activity to demonstrate that the action conforms to the applicable SIP required under Section 110(a) of the Federal CAA (42 USC 7410[a]) before the action is otherwise approved. In this context, conformity means that such Federal actions must be consistent with a SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of those standards. Each Federal agency must determine that any action that is proposed by the agency and that is subject to the regulations implementing the conformity requirements will, in fact, conform to the applicable SIP before the action is taken. This project is subject to the General Conformity Rule since it is sponsored and supported by a Federal agency.

On November 30, 1993, USEPA promulgated final general conformity regulations at 40 CFR 93 Subpart B for all Federal activities except those covered under transportation conformity. The general conformity regulations apply to a proposed Federal action in a non-attainment or maintenance area if the total of direct and indirect emissions of the relevant criteria pollutants and precursor pollutants caused by the proposed action equal or exceed certain *de minimis* amounts, thus requiring the Federal agency to make a determination of general conformity. The *de minimis* amounts for the region covering Truckee Meadows are presented in Table 5-39.

Table 5-39. General Conformity *de minimis* Thresholds.

Pollutant	Federal Status	*De minimis* Threshold (TPY[a])
PM_{10}	Nonattainment, Serious	70
CO	Attainment, Maintenance	100
O_3 (measured as NOx or VOCs)	Attainment, Maintenance	100

[a] TPY = tons per year
Source: 40 CFR 93.153.

By requiring an analysis of direct and indirect emissions, USEPA intended to have only those emissions that are reasonably foreseeable and that the Federal agency can practicably control subject to that agency's continuing program responsibility be addressed.

Air Quality Management at the Local Level

The Washoe County District Board of Health governs the air quality management, permitting, and compliance in the County. Under the district Regulation 040.030, there are specific requirements on fugitive dust control for construction activities, which were applied in emission calculations as discussed below. Although there is a potential health risk from exposure to diesel particulate matter from diesel-fueled construction equipment, the Washoe County District Board of Health does not require health risk assessments for mobile sources; therefore, one was not completed as part of this analysis.

Existing Air Quality

The existing air quality conditions for a project area are typically the result of meteorological conditions and existing emission sources in an area. As stated previously, the remaining areas of Washoe County, all of Storey County, and the Pyramid Lake Paiute Indian lands are classified as attainment for all criteria pollutants, therefore, emissions inventories for these areas are not discussed below.

Washoe County Emissions Inventories

The WCAQMD has compiled the 2008 emissions inventories for the Truckee Meadows CO/PM_{10} NAA and for the Washoe County O_3 AA. These emission inventories are presented in Tables 5-40 and 5-41, respectively.

Table 5-40. 2008 Emissions Inventory for Truckee Meadows CO/PM_{10} NAA.

Source Category	2008 Annual Emissions (tons per year)					
	VOC	NOx	CO	PM_{10}	$PM_{2.5}$	NH_3[a]
Point Sources	183	681	3,031	12	12	0
Non-Point Sources	7,282	775	3,174	5,995	1,164	2
Non-Road Mobile Sources	2,111	1,474	16,662	136	130	N/D
On-Road Mobile Sources	3,323	4,026	40,057	120	74	283
Total	**12,899**	**6,957**	**62,923**	**6,263**	**1,380**	**285**

[a] NH_3 is ammonia
Source: Washoe County, 2010a.

Table 5-41. 2008 Emissions Inventory for Washoe County O3 AA.

Source Category	2008 Annual Emissions (tons per year)					
	VOC	NOx	CO	PM_{10}	$PM_{2.5}$	NH_3[a]
Point Sources	937	5,542	6,508	302	29	0
Non-Point Sources	9,087	1,065	7,768	11,099	2,181	2
Non-Road Mobile Sources	3,026	3,432	28,224	273	260	N/D
On-Road Mobile Sources	3,957	5,122	48,133	157	100	341
Total	**17,007**	**15,161**	**90,633**	**11,831**	**2,570**	**343**

[a]NH_3 is ammonia
Source: Washoe County, 2010a.

Monitoring Data – Concentrations of Criteria Pollutants Concentrations

Air quality data from the Reno monitoring station from 2007-2009 is summarized in Table 5-42 and was taken from the *Washoe County, Nevada, Air Quality Trends 2000-2009 Report*, prepared in April 2010 by the WCAQMD (Washoe County 2010c).

Table 5-42. Summary of Air Pollutant Monitoring Data in Reno, Nevada from 2007-2009.

Pollutant	Average Time	2007	2008	2009	NAAQS
CO (ppm)	1-hr (2nd High)	3.5	2.5	2.9	35
	8-hr (2nd High)	2.2	1.6	2.1	9
O_3 (ppm)	8-hr (4th High)	0.071	0.076	0.065	0.075
NO_2 (ppm)	Annual	0.019	0.018	0.017	0.053
PM_{10} (ug/m^3)	24-hr (2nd High)	67	84	72	150
$PM_{2.5}$ (ug/m^3)	24-hr (2nd High)	26.5	61.0	41.2	35
	Annual	8.0	10.2	10.2	15

Source: Washoe County, 2010c.

5.13.2 Environmental Consequences

This section identifies and evaluates the potential effect of the proposed alternatives on the air quality in the project area.

Significance Criteria and Thresholds

Direct and indirect effects on air quality were considered significant if implementation of an alternative plan would result in any of the following:

- Exceed Federal, State, or local air quality standards established for specific pollutants.
- Contribute substantially to an existing exceedance of an air quality standard (for pollutants in

non-attainment).

The major thresholds are the NAAQS and the General Conformity de minimis emission levels for CO, PM_{10}, and the O_3 precursors (Nitrogen oxides [NO_x] and volatile organic compounds [VOC]). These thresholds are provided in Tables 5-37 and 5-39, respectively.

Although odors associated with construction equipment would have an effect on air quality during construction, these effects were not analyzed due to the short term, temporary nature of the effect and are considered less than significant.

Methodology

The construction emissions were estimated for various sources using emission factors and construction schedules, in terms of number of work days, hours and equipment, and haul truck miles traveled. The emission factors for stationary sources were obtained from AP-42 (USEPA, 1995) and a study report by Midwest Research Institute (MRI, 1996). The mobile source emission factors were developed from USEPA Non-Road (USEPA, 2005b) and Mobile 6 (USEPA, 2003) models. The following construction sources and activities were analyzed for emissions:

- Earth moving, grading (cut/fill) fugitive dust.
- On-site construction equipment and haul truck engine emissions (all pollutants).
- Off-site haul truck engine emissions (all pollutants).
- On-site and off-site haul truck fugitive dust emissions for paved and unpaved road travel.
- Off-site worker vehicle trips to and from project site, including paved road dust.

Construction of the proposed improvements under each alternative would start in 2015 and would continue for five years. Emissions of criteria pollutants would occur during construction activities at each of the proposed improvements sites. Typical construction activities including site grading and hauling would contribute to fugitive dust emissions or on- and off-site diesel exhaust emissions. Typical control efficiencies for fugitive dust reduction measures range from 70 to 95 percent (USEPA, 1995). Watering for fugitive dust control of PM_{10} has typical control efficiencies of 75 to 95 percent (Cowherd, et al., 1990). Therefore, once the uncontrolled earth moving fugitive dust emissions were determined, the PM_{10} emissions were reduced by 87 percent to account for compliance with Washoe County District Regulation 040.030.

Although pump stations for interior drainage would be operational sources, they are expected to be electrically driven and an air quality assessment for these pump stations was not completed. Emissions from the proposed construction of the various flood control measures were included in the air quality analysis. Construction effects were estimated following the methodology described in the Air Quality Technical Report prepared by HDR/CDM for this project (HDR/CDM, 2011a).

No Action Alternative

Under the No Action Alternative, no Federally funded flood risk management improvements would take place in the project area. Therefore, no emissions of criteria pollutants as a result of the proposed improvements would occur. Hydrographic Area 87 – Truckee Meadows is designated as serious nonattainment for 24-hour PM_{10}. All other project areas are classified as attainment for all Federal CAA criteria pollutants. Washoe County District Board of Health will continue to manage air quality in the region, implementing emission-reduction requirements set forth by the SIP. Based on a

review of the *Washoe County, Nevada, Air Quality 2000-2009 Trends Report* (Washoe County 2010c) existing sources of air pollution would be expected to remain the same in the project area in the near-term future. Therefore, Hydrographic Area 87 would continue in the near-term future to be designated by the USEPA as being in serious non-attainment for PM_{10}.

Alternative 3-Floodplain Terrace Plan

An analysis of current and future air quality conditions was carried out on a much larger Floodplain Terrace Plan in 2011 (HDR/CDM, 2011a). That analysis also considered potential project features beyond the current extent of the project area. However, the information compiled for the Truckee Meadows and Lower Truckee River reaches was still considered useful in scaling the analysis down to the current proposed Floodplain Terrace Plan alternative. The following discussion on air quality conditions draws from that analysis and compares potential changes to air quality as a result of the current project alternative to the results of the 2011 analysis. Where necessary, clarification is made regarding difference in scale between the 2011 project scope assumptions and the current alternative being considered.

In general, the difference in the 2011 Floodplain Terrace Plan features in the Truckee Meadows reach was the inclusion of an extensive ecosystem restoration plan that also extended floodplain terraces downstream of McCarran Boulevard to Steamboat Creek, terraced within the Vista Reefs, and more recreation features. The 2011 plan also included extensive ecosystem restoration in the Lower Truckee River reach in addition to approximately 11 miles of scour protection in the lower reach.

Table 5-43 below provides a summary of the estimated annual emission rates for VOC, NO_x, CO, SO_2, PM_{10}, and $PM_{2.5}$ under the 2011 Floodplain Terrace Plan (1.33% ACE). In cases where emission factors were only provided for PM_{10}, appropriate PM size profiles were used to estimate $PM_{2.5}$ emissions. Detailed calculation tables that provide emissions by year and by general source categories are included in the Air Quality Technical Report (HDR/CDM, 2011a).

Table 5-43. Alternative 3-Floodplain Terrace Plan (2011 Plan) Construction Emissions – All Reaches.

Alternative-3	VOC	NOx	CO	SO_2	PM_{10}[a]	$PM_{2.5}$[b]
Year	**Annual Emissions in tons/year**					
1	3.05	39.57	20.42	0.63	44.70	29.80
2	3.69	48.55	24.62	1.33	65.40	56.70
3	2.29	34.18	15.56	1.80	32.60	21.10
4	0.64	10.72	4.62	0.25	21.60	12.30
5	0.09	2.22	0.79	0.01	5.20	0.20

[a] Total PM_{10} emissions from all sources (exhaust, fugitive dust, paved, and unpaved). Includes 87% reduction on uncontrolled PM_{10} emissions due to compliance with Regulation 040.030.
[b] Total $PM_{2.5}$ emissions from all sources (exhaust, fugitive dust, paved, and unpaved). Assumes 16% reduction on uncontrolled $PM_{2.5}$ emissions due to compliance with Regulation 040.030.

Alternative 2-Detention Plan

Table 5-44 below provides a summary of the estimated annual emission rates for VOC, NO_x, CO, SO_2, PM_{10}, and $PM_{2.5}$ under the Detention Plan . In cases where emission factors were only provided for PM_{10}, appropriate PM size profiles were used to estimate $PM_{2.5}$ emissions. Detailed calculation tables that provide emissions by year and by general source categories are included in the Air Quality Technical Report (CDM, 2008).

Table 5-44. Alternative 2-Detention Plan Unmitigated[a] Construction Emissions – All Reaches

Alternative-2	VOC	NOx	CO	SO_2	PM_{10}[a]	$PM_{2.5}$[b]
Year	**Annual Emissions in tons/year**					
1	0.811	12.000	5.634	0.140	14.605	12.269
2	0.916	13.232	6.258	0.262	9.512	7.990
3	1.199	16.667	8.122	0.316	15.083	12.670
4	0.806	11.600	5.517	0.265	10.658	8.953
5	0.459	7.238	3.265	0.480	5.456	4.583
6[c]	0.215	3.387	1.528	0.229	2.312	1.942

[a] Includes 80% reduction on uncontrolled PM_{10} emissions due to compliance with Regulation 040.030.
[b] Assumes 16% reduction on uncontrolled $PM_{2.5}$ emissions due to compliance with Regulation 040.030.
[c] The year 5 activity – Huffaker Detention Facility, has a 540 day construction schedule, therefore its activity extends into year 6.

Significance of Peak Emissions by Alternative

Table 5-45 compares the peak emissions for each pollutant by alternative. Model results show that the amount of construction activity under the Detention Plan causes the peak annual emissions to be lower than the Floodplain Terrace Plan . Internal combustion engines in the on-site construction equipment and on-road haul trucks produce the majority of the gaseous pollutant emissions (NOx, VOC, CO, and SO_2). Earth moving activities produce the bulk of the PM_{10} emissions and a substantial portion of the $PM_{2.5}$ emissions.

Table 5-45. Peak Construction Year Emissions for Alternative 3-Floodplain Terrace Plan (2011 Plan) and Alternative 2-Detention Plan .

Alternative	VOC	NOx	CO	SO_2	PM_{10}[a]	$PM_{2.5}$[b]
	Annual Emissions in tons/year					
Floodplain Terrace Plan (1.33% ACE)	3.69 (Year 2)	48.55 (Year 2)	24.62 (Year 2)	1.80 (Year 3)	65.40 (Year 2)	68.50 (Year 2)
Detention Plan	1.2 (Year 3)	16.67 (Year 3)	8.122 (Year 3)	0.48 (Year 5)	15.08 (Year 3)	12.67 (Year 3)

[a] Total PM_{10} emissions from all sources (exhaust, fugitive dust, paved, and unpaved). Includes 87% reduction on uncontrolled PM_{10} emissions due to compliance with Regulation 040.030.
[b] Total $PM_{2.5}$ emissions from all sources (exhaust, fugitive dust, paved, and unpaved). Assumes 16% reduction on uncontrolled $PM_{2.5}$ emissions due to compliance with Regulation 040.030.

Comparison of the peak year emissions with the General Conformity de minimis thresholds provided in Table 5-39 indicates that emissions of all non-attainment or maintenance pollutants (CO, PM_{10}, NOx and VOC) for both alternatives are less than the de minimis thresholds. The project construction emissions from either alternative would be less than the General Conformity de minimis thresholds and would have a less than significant effect on air quality. Therefore, no additional General Conformity evaluation is necessary per 40 C.F.R. §93.153(c)(1). Compliance with Washoe County District Regulation 040.030 for the control of fugitive dust from construction activities along with obtaining and implementing the requirements set forth in the dust control permit for the project would further reduce PM_{10} and $PM_{2.5}$ construction emissions under each alternative.

5.13.3 Mitigation Measures

Alternative 3-Floodplain Terrace Plan and Alternative 2-Detention Plan

The project contractors will be required to comply with Washoe County District Regulation 040.030 for the control of fugitive dust from construction projects. A dust control permit will be obtained from the district before the start of construction. The permit will describe all control measures to be implemented before, during, and after any dust generating activity. Potential control measures may include, but are not limited to:

- Paving.
- Pre-wetting.
- Applying dust suppressants.
- Stabilizing with vegetation, gravel, re-crushed/recycled asphalt or other forms of physical stabilization.
- Limiting, restricting, phasing and/or rerouting motor vehicle access.
- Reducing vehicle speeds and/or number of vehicle trips.
- Limiting use of off-road vehicles on open areas and vacant lots.
- Utilizing work practices and/or structural provisions to prevent wind and water erosion onto paved public roadways.
- Using dust control implements appropriately.
- Installing one or more grizzlies, gravel pads, and/or wash down pads adjacent to the entrance of a paved public roadway to control carry-out and trackout.
- Keeping open-bodied haul trucks in good repair, so that spillage may not occur from beds, sidewalls, and tailgates.
- Covering the cargo beds of haul trucks to minimize wind-blown dust emissions and spillage.

The on-road and non-road mobile equipment typically used on construction projects are subject to USEPA regulations. No other air quality mitigation measures are proposed at this time.

5.14 NOISE AND VIBRATION

A detailed assessment of the existing noise and vibration environment in the project area in addition to an analysis of potential noise and vibration effects resulting from construction of project features is detailed in a Noise and Vibration Technical Report prepared by CDM for this project (CDM, 2008). Results of this analysis are discussed below. No long-term effects to sensitive noise receptors or exceedence of vibration limits are expected as a result of this project.

5.14.1 Affected Environment

This section describes the existing noise environment in the project area. This includes noise standards and criteria, construction sources and levels of noise, and noise sensitive-receptors.

Noise and Vibration Background

A brief background in sound is helpful in understanding how humans perceive various noise levels. Noise is measured in decibels (dB) and is a measurement of sound pressure level. The human ear

perceives sound, which is mechanical energy, as pressure on the ear. The sound pressure level is the logarithmic ratio of that sound pressure to a reference pressure, and is expressed in dB. Environmental sounds are measured with the A-weighted scale of the sound level meter. The A-weighted scale simulates the frequency response of the human ear, by giving more weight to the middle frequency sounds, and less weight to the low and high frequency sounds. A-weighted sound levels are designated as dBA.

Background noise is the cumulative of all perceptible, but not necessarily identifiable, noise sources (such as traffic, airplanes, and environmental sounds) that create a constant ambient noise baseline. Although extremely loud noises can cause temporary or permanent damage, the primary effect of environmental noise is annoyance. The range of human hearing spans from the threshold of hearing (near 0 dBA) to exceeding the threshold of pain (120 dBA). In general, humans will notice a change of sound greater than 3 dBA. Noise levels greater than 85 dBA can cause temporary or permanent hearing loss, if exposure is prolonged.

The equivalent noise level (L_{eq}) is the constant sound level that in a given period has the same sound energy level as the actual time-varying sound pressure level. L_{eq} provides a methodology for combining noise from individual events and steady state sources into a measure of cumulative noise exposure. It is used by some local jurisdictions and the Federal Highway Administration (FHWA) to evaluate noise effects.

In addition to evaluating noise effects based on complying with noise standards, project noise effects can also be assessed by relative criteria, or the incremental changes in existing noise levels. The effect of increasing or decreasing noise levels is presented in Table 5-46. For example, it shows that a change of 3 dBA is barely perceptible and that a 10-dBA increase or decrease would be perceived by someone to be a doubling or halving of the noise level (loudness).

Table 5-46. Decibel Changes, Loudness, and Energy Loss.

Sound Level Change (dBA)	Relative Loudness	Acoustical Energy Loss (%)
0	Reference	0
-3	Barely Perceptible Change	50
-5	Readily Perceptible Change	67
-10	Half as Loud	90
-20	1/4 as Loud	99
-30	1/8 as Loud	99.9
Source: FHWA, Highway Traffic Noise Analysis and Abatement Policy and Guidance, June 1995.		

Similar to noise levels, vibration velocity levels are also expressed in dB. Typically, the abbreviation "VdB" is used for vibration decibels to reduce the potential for confusion with sound decibels. 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 VdB or lower, well below the threshold of perception for humans which is around 65 VdB. 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. If the roadway is smooth, the vibration from traffic is rarely perceptible (FTA, 2006).

Applicable Noise and Vibration Criteria

Noise

The project area includes noise-sensitive land uses in Washoe and Storey Counties and the Cities of Reno and Sparks. The applicable noise ordinances and standards are:

- City of Reno, Nevada, Municipal Code, Title 18 Annexation and Land Development, Section 18.12.304.
- City of Sparks, Nevada, Municipal Code, Sections 7.16 and 20.28.060.
- Washoe County Department of Community Development, Washoe County Development Code, May 2004.

Each of these jurisdictions has established noise standards for various land uses, except for the City of Sparks and Storey County. However, each jurisdiction exempts construction and demolition activities that occur during daytime hours. A brief description of the noise standards and construction noise exemptions is provided in the Noise and Vibration Technical Report.

In addition to local noise standards, the FHWA Noise Abatement Criteria (FHWA NAC) (23 CFR Part 772), which have been interpreted and implemented for projects in Nevada by Nevada Department of Transportation (NDOT), were applied to this project. These criteria are included in the NDOT Traffic and Construction Noise Abatement Policy (herein referred to as the Noise Policy).

The FHWA NAC, presented in Table 5-47, were developed for specific land use categories, and are based on one-hour average L_{eq} noise levels (FHWA, 1982). The FHWA noise standards indicate that noise mitigation must be considered when the Horizon Year project levels approach or exceed the stated FHWA NAC. In addition, the FHWA noise standards also indicate that noise mitigation must be considered when the Future-Year or Horizon-Year project levels "substantially" exceed existing noise levels. The NDOT Noise Policy defines "approach the noise abatement criteria" (23 CFR 772.5[g]) as 1 dBA below the FHWA NAC and defines "substantially exceed" as a predicted incremental effect equal to or greater than 15 dBA over existing noise levels.

Table 5-47. FHWA Noise Abatement Criteria.

Activity Category	L_{eq}(1hr) (dBA)	Description of Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve intended purpose.
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.
Source: 23 CFR Part 772.		

Vibration

The City of Reno has established vibration limits for permanent sources generating vibration. The vibration limits are set at the property boundary of the source of vibration. These vibration limits are not applicable to temporary construction activities. None of the jurisdictions have established construction

vibration limits.

Noise-Sensitive Land Uses and Receptors

The existing ambient noise conditions in the project area were estimated using previous noise studies in the project area, USEPA guidance documents, and the results of a roadway screening noise modeling analysis. The use of existing ambient noise monitoring data from previous studies conducted in the more urban setting of the project area is a reasonable approach for estimating background noise levels. Daytime noise levels in these areas are influenced primarily by traffic and other urban noise sources, and do not significantly change over time. The use of other USEPA reference documents and review of surrounding land use conditions is also a reasonable approach for estimating ambient noise conditions.

Since it is anticipated that construction will occur only during daylight hours, one-hour L_{eq} noise levels were used to define the existing background noise levels. L_{dn} noise levels provided in the USEPA Levels Document (USEPA, 1974) were used to estimate average ambient daytime L_{eq} noise conditions for portions of the Truckee Meadows reach. For those representative noise-sensitive receptor locations that may also be affected by construction traffic noise effects, TNM2.5 was used to estimate existing noise levels.

A review of existing topographic and aerial photographs was used to select representative noise sensitive receptors at 17 locations determined to be closest to the project construction areas or traffic routes. These receptors are shown in Figures 5-8 through 5-10 and are summarized in Table 5-48. Although there are additional noise-sensitive receptors in the four project reaches, information from the 17 representative noise sensitive receptors can be applied to these additional receptors. The 17 representative noise sensitive receptors encompass a variety of land uses. In addition, parcels that would be potentially relocated as a result of the proposed alternatives were not considered for noise sensitive receptors.

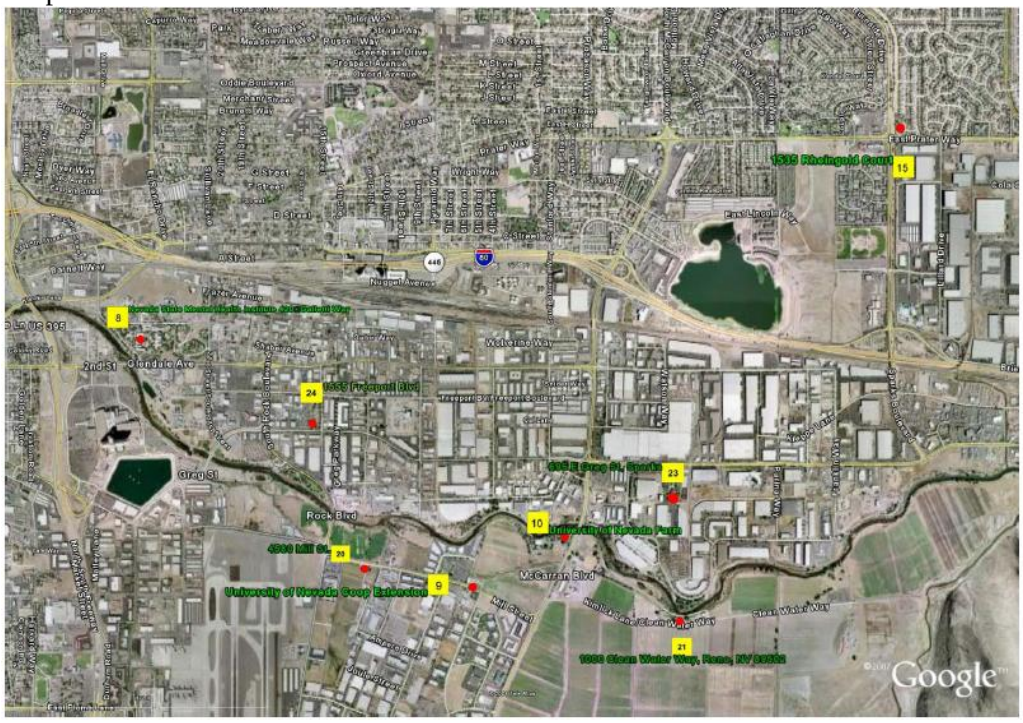


Figure 5-8. Sensitive Noise Receptors—Truckee Meadows Reach.

Figure 5-9. Sensitive Noise Receptors—Eastside and Hidden Valley Developments.

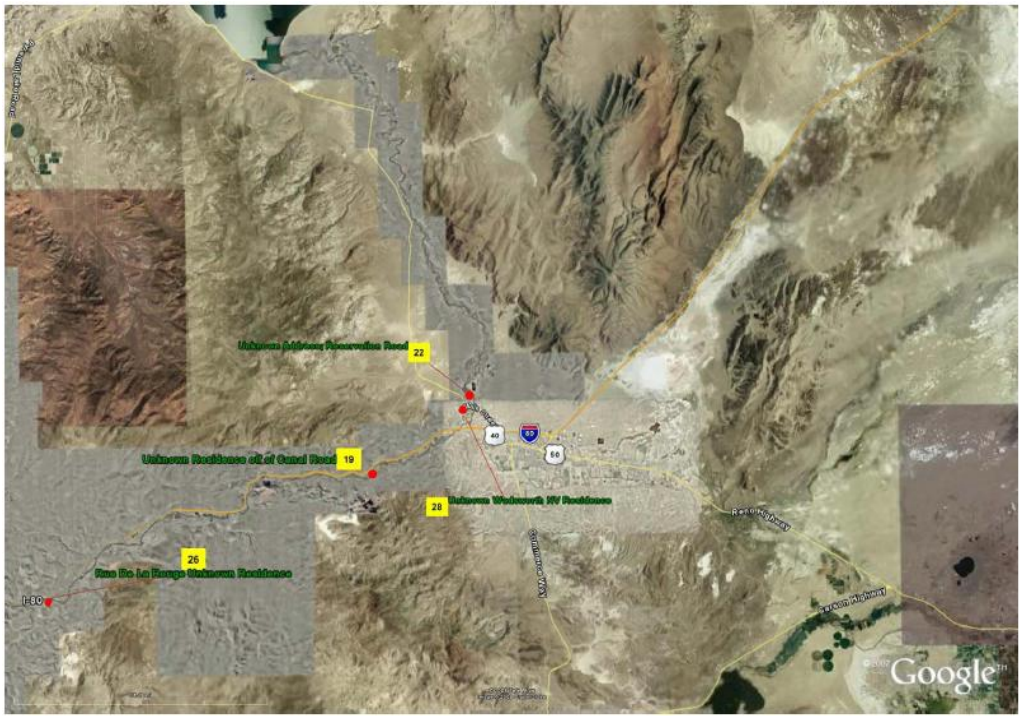


Figure 5-10. Sensitive Noise Receptors—Lower Truckee River Reach.

Table 5-48. Estimated Existing Noise Levels.

Receptor ID	Receptor Description	Land Use	Daytime peak hour L_{eq} Levels (dBA)
R-8	420 Galletti Way	Commercial	64
R-9	UNR Coop Ext	Commercial	55
R-10	UNR Farms	Urban Residential	55
R-12	4205 Perro Lane	Rural Residential/ Suburban	61
R-13	2955 Fairwood Lane	Rural Residential/ Suburban	61
R-14	4341 Hidden Valley Dr	Rural Residential/ Suburban	50
R-15	1535 Rheingold Ct	Urban Residential	50
R-19	Residence South of Painted Rock Bridge	Rural Residential/ Suburban	57
R-20	4580 Mill St	Commercial	55
R-21	1000 Clean Water Way	Rural Residential/Suburban	65
R-22	Reservation Road Unknown Residence	Rural Residential/ Suburban	55
R-23	695 Greg St Trailer Park	Commercial	55
R-24	1555 Freeport Rd #36, Sparks	Commercial	65
R26	Rue De La Rouge Unknown Residence	Rural Residential/ Suburban	55
R-27	4880 Pembroke Drive	Rural Residential/ Suburban	63
R-28	Main Street Residence, Wadsworth	Residential	62
R-29	2702 Chavez Drive	Rural Residential/ Suburban	72

Existing Vibration Conditions

Within downtown Reno, motor vehicle and freight and passenger rail traffic are the major source of ground-borne vibration. Ground-borne vibration levels generated by trucks and buses at distances of 50 to 100 feet are usually in the range of 55 to 60 VdB, which is below the perception threshold of most humans. When locomotives and rail cars are operating in the area, vibration levels range from 65 to 75 VdB within 100 feet from the rail line (FTA, 2006). In areas outside of downtown Reno and away from major traffic areas, particularly to the east of McCarran Boulevard, ground-borne vibration levels are anticipated to be less than 50 VdB.

5.14.2 Environmental Consequences

This section describes significance criteria, and analysis results of the potential noise effects from construction and the indirect effects of construction truck traffic activities. The construction noise analysis is presented first, followed by the construction truck traffic noise analysis, and the vibration effects analysis.

Significance Criteria

Construction Noise

No standardized criteria have been developed for assessing construction noise effects. As a result, criteria are typically developed on a project-specific basis unless local ordinances can be found to apply. Project-related construction noise criteria should take into account the existing noise environment, the

absolute noise levels during construction activities, the duration of construction, and the adjacent land use. There are two principal criteria for evaluating noise effects of a project: 1) evaluating the increase in noise levels above the existing ambient levels as a result of the project; and, 2) compliance with relevant standards and regulations. NEPA requires comparing project-related noise levels with the noise levels of the No Action Alternative. Because there are no specific construction noise limits defined under NEPA, the following general guidelines were used to develop short-term (peak hour) daytime construction noise limits based on existing ambient noise levels and land uses:

- Rural and suburban residential land use: +5 dBA above ambient.
- Urban residential land use: +10 dBA above ambient.
- Commercial land use: +15 dBA above ambient.
- Industrial land use: +20 dBA above ambient.

This analysis assumes that estimated construction noise levels that are above land use based construction noise limits would be potentially significant and would require evaluating construction noise mitigation measures.

The project area includes noise-sensitive land uses in Washoe and Storey Counties and the Cities of Reno and Sparks. However, each jurisdiction exempts construction and demolition activities that occur during the daytime. Construction activities for this project will occur during the daytime; therefore, there are no applicable local noise standards.

Construction Truck Traffic

Indirect noise effects from construction truck traffic would be considered significant and would require the evaluation of noise mitigation measures, if either of the following outcomes were predicted by the noise modeling results:

- The increase in existing noise levels, as a result of construction-related traffic associated with the action alternatives, would be 15 dBA or more per NDOT noise policy; or,
- The incremental change in traffic noise levels due to construction-related traffic from actions related to the project would, at any noise-sensitive receptor, increase the peak hour L_{eq} noise levels by 5-dBA or more above those of the No-Action/No Project Alternative. A 5-dBA threshold was selected since this change in noise levels is considered readily perceptible by humans.

Construction Vibration Criteria

As described above, none of the jurisdictions in the project area have established construction vibration limits. According to the FHWA Construction Noise Handbook, “there are no FHWA requirements directed specifically to traffic-induced or construction-related vibration. Most studies conducted by state departments of transportation to assess the impact of operational traffic-induced vibrations have shown that both measured and predicted vibration levels are less than any known criteria for structural damage to buildings, although levels may be such as to cause various degrees of annoyance” (FHWA, 2006).

According to the Federal Transportation Administration (FTA) Transit Noise and Vibration Impact Assessment, the primary concern regarding construction vibration relates to potential damage effects (FTA, 2006). Measurements of vibration are expressed in terms of either the peak particle velocity (PPV) in the unit of inches per second or vibration velocity levels, expressed in terms of VdB.

FTA criteria for the evaluation of potential annoyance or interference with vibration-sensitive activities due to construction vibration varies, with ranges from 0.12 PPV for buildings extremely susceptible to vibration damage, to 035 PPV for structures of reinforced-concrete, steel or timber.

Methodology

Construction Noise

Each of the construction activities was analyzed for their potential noise effects on the 17 representative noise-sensitive receptors. The noise effects associated with the alternatives were then identified in terms of the specific features included in each alternative and the associated construction-related noise effects were characterized accordingly.

The types of construction equipment that are expected to be used for the alternatives were input into the FHWA, Roadway Construction Noise Model (RCN), January 2006, to predict unmitigated and mitigated noise effects for both project alternatives. The RCN model provides the L_{max} sound level and percent of time the equipment would be operated at full power (usage factor) for each piece of construction equipment used. The L_{max} sound levels represent typical maximum noise that normally occurs during full power operation of the equipment. These levels typically only occur for a short duration, since the equipment is not operated at full power for an entire workday. Based on the full power usage factor, the RCN model calculates L_{eq} noise levels.

Construction Truck Traffic

The proposed regional haul routes in the cities of Reno and Sparks include Highway 395, I-80, and McCarran Boulevard. The existing and future No Action Alternative average daily traffic (ADT) volumes along these highways and roadways would not be substantially affected by any vehicle additions as a result of the Truckee Meadows Flood Control Project. The combined construction workers and haul truck ADT volumes represent less than one percent of the total ADT volume along these proposed regional haul routes. In order to project an appreciable noise level increase of 3 dBA or greater would require the traffic volumes to double the existing or No Action Alternative traffic volumes. Therefore, a detailed traffic noise modeling analysis was not conducted for the regional haul routes.

For those portions of the construction activities located in more remote or rural locations where background traffic volumes are lower, the increase in construction truck activities could have the potential to generate construction truck traffic noise effects. Therefore, a traffic noise modeling analysis was conducted for these few locations. Traffic noise levels generated from trucks hauling materials on local roads were evaluated for five representative noise-sensitive receptors (R-19, R-26, R-27, R-28, and R-29) and compared with existing ambient and No Action Alternative noise levels to determine the need to evaluate noise mitigation measures. Traffic noise levels were estimated for trucks hauling aggregate materials using the FHWA Traffic Noise Model, Version 2.5 (TNM2.5). TNM2.5 was used to estimate noise levels for the existing, No Action Alternative and action alternatives along the proposed truck haul routes.

Traffic noise modeling for the proposed alternatives was conducted only for those construction years with the highest projected number of truck trips, since these would be the years that would generate the highest traffic noise effects. Appendix B of the Noise and Vibration Technical Report (CDM, 2008) presents a summary of the truck ADT volumes by year for each alternative.

Construction Vibration

Construction activities have the potential to produce noise vibration levels that may be annoying or disturbing to humans and may cause damage to structures, as described above. Vibration from

construction projects is caused by general equipment operations, and is usually highest during pile driving, soil compacting, jack hammering and construction related demolition and blasting activities. Vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. As noted above, measurements of vibration are expressed in terms of either the PPV or vibration velocity levels, expressed in terms of VdB. The PPV, a quantity commonly used for vibration measurements, is the maximum velocity experienced by any point in a structure during a vibration event. It is an indication of the magnitude of energy transmitted through vibration. PPV is an indicator often used in determining potential damage to buildings from stress associated with blasting and other construction activities.

Table 5-49 summarizes the levels of vibration and the usual effect on people and buildings based on the U.S. Department of Transportation guidelines for vibration levels from construction-related activities. Table 5-50 displays vibration levels for typical construction equipment.

Table 5-49. Summary of Vibration Levels and Effects on Humans and Buildings.

Peak Particle Velocity (in/sec)	Ground-Bourne Vibration (VdB)	Effects on Humans	Effects on Buildings
<0.005	<62	Imperceptible	No effect on buildings
0.005 to 0.015	62 to 72	Barely perceptible	No effect on buildings
0.02 to 0.05	74 to 82	Level at which continuous vibrations begin to annoy people in buildings	No effect on buildings
0.1 to 0.5	88 to 102	Vibrations considered unacceptable for people exposed to continuous or long-term vibration	Minimal potential for damage to weak or sensitive structures.
0.5 to 1.0	102 to 108	Vibrations considered bothersome by most people, however tolerable if short-term in length	Threshold at which there is a risk of architectural damage to buildings with plastered ceilings and walls. Some risk to ancient monuments and ruins.
1.0 to 2.0	108 to 114	Vibrations considered unpleasant by most people	U.S. Bureau of Mines data indicates that blasting vibration in this range will not harm most buildings. Most construction vibration limits are in this range.
>3.0	>117	Vibration is unpleasant	Potential for architectural damage and possible minor structural damage.

Source: Michael Minor & Associates, 2006.

Table 5-50. Vibration Levels for Typical Construction Equipment.

Equipment	Peak Particle Velocity at 25 feet (in/sec)	Approximate L_v at 25 feet
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Trucks	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Notes: Lv = velocity level in decibels (i.e., VdB) referenced to 1 micro inch/second and based on the root mean square velocity amplitude.

Source: FTA, 2006

No Action Alternative

Under the No Action Alternative, the Truckee Meadows Flood Control Project would not be constructed; therefore, there would be no construction noise or construction truck traffic. Existing noise conditions under the No Action Alternative would not change. Future noise levels would be expected to increase due to increasing regional traffic and development. Therefore, there would be no effect on noise or vibration as a result of the No Action Alternative.

Alternative 3-Floodplain Terrace Plan

The noise and vibration analysis carried out by CDM in 2008 was based on a Floodplain Terrace Plan that was significantly larger than the current plan. That analysis also considered potential project features beyond the current extent of the project area. However, the information compiled for the Truckee Meadows and Lower Truckee River reaches was still considered useful in scaling the analysis down to the current proposed Floodplain Terrace Plan alternative. The following discussion on noise and vibration conditions draws from that analysis and compares potential changes to noise and vibration as a result of the current project alternative to the results of the 2008 analysis. Where necessary, clarification is made regarding difference in scale between the 2008 project scope assumptions and the current alternative being considered.

In general, the difference in the 2008 Floodplain Terrace Plan features in the Truckee Meadows reach was the inclusion of an extensive ecosystem restoration plan that also extended floodplain terraces downstream of McCarran Boulevard to Steamboat Creek, terraced within the Vista Reefs, and more recreation features. The 2008 plan also included extensive ecosystem restoration in the Lower Truckee River reach in addition to approximately 11 miles of scour protection in the lower reach.

Table 5-51 presents a summary of the projected daytime unmitigated noise levels for the 2008 Alternative 3 plan at each noise-sensitive receptor and compares them to the significance criteria.

The results of the construction noise effect analysis were compared to the significance criteria. It should be noted that the results of the construction noise effect analysis represent average noise effect conditions. There would be times during construction activities when construction noise levels at each of the noise-sensitive receptors could be higher and lower than those presented below. This would be true when construction activities occur either closer to or further way from noise-sensitive receptors than at the center of the proposed construction activities, as assumed for this noise effect analysis.

Under the 2008 Alternative 3, the unmitigated daytime L_{eq} noise levels would range from 55 dBA to75 dBA. These daytime L_{eq} noise levels would be below the construction noise limits for all the noise-sensitive receptors, except for R-10, R-14, R-19, R-21 and R-22.

These effects at noise-sensitive receptors R-10, R-14, R-19, R-21 and R-22 would be significant. However, for the current smaller Floodplain Terrace Plan, the R-10 sensitive receptor (Sagewinds property) is proposed for removal. The current plan no longer includes proposed features in the vicinity of R-14 (Hidden Valley), R-21 (1000 Clean Water Way) R-22 (Wadsworth), or R-19 (Painted Rock Bridge).

Table 5-51. Construction Unmitigated Noise Levels for Alternatives 3.

Receptor ID.	Description	Alternative 3 L_{eq} Noise (dBA)	Construction Noise Limits (dBA)
R-8	420 Galletti Way	71	79
R-9	UNR Coop Ext	61	70
R-10	UNR Farms	**73**	65
R-12	4205 Perro Lane	--	65
R-13	2955 Fairwood Lane	--	55
R-14	4341 Hidden Valley Dr	**59**	55
R-15	1535 Rheingold Ct	75	76
R-19	Residence South of Painted Rock Bridge	**66**	62
R-20	4580 Mill St	61	70
R-21	1000 Clean Water Way	**74**	65
R-22	Reservation Road Unknown Residence	**67**	60
R-23	695 Greg St Trailer Park	57	70
R-24	1555 Freeport Rd #36 Sparks	65	80
R-26	Ave de la Bleu de Clair Resident	55	56
R-27	4880 Pembroke Drive	--	68

Note: Bold values indicate an exceedance of the noise limit.
Barriers and portable barriers will be used to mitigate noise exceedances

Construction truck traffic noise effects at the five representative noise-sensitive receptors (R-19, R-26, R-27, R-28, and R-29) for the 2008 Alternative 3 plan were compared with existing ambient and No Action Alternative noise levels. Table 5-52 presents a summary of the projected truck traffic daytime peak hour L_{eq} noise levels for each noise-sensitive receptor and the 2008 plan.

The existing peak hour noise levels (daytime L_{eq}) for four of the five representative noise sensitive receptors are less than the FHWA NAC of 66 dBA (R-19, R-26, R-27, and R-28); however, the existing peak hour noise level for R-29 is 71.5 dBA. The transport of construction materials, and equipment under Alternative 3 would generate daytime peak hour L_{eq} noise level increases of 2 dBA or less when compared to existing noise levels at the five representative noise-sensitive receptors. These noise level increases would be well below the NDOT noise policy of a 15-dBA allowable noise level increase over existing conditions. Even though the current Floodplain Terrace Plan no longer proposes features at R-27 and R-29, the 2008 analysis suggests that even with the larger scale project, mitigation for noise generated by construction traffic would not be required.

Similarly, Alternative 3 would generate a 1-dBA increase or less in peak hour L_{eq} noise levels when compared to the No Action Alternative noise levels. These incremental changes are below the 5-dBA significance criterion threshold. Therefore, construction truck traffic noise would be less than significant and would not require mitigation.

Table 5-52. Truck Traffic Noise Summary for 2008 Alternative 3 Plan Noise Levels.

Receptor ID	Project/Receptor Description	Existing Noise Levels dBA	Alternative 3	
			Without Project dBA	With Project dBA
R-19, Canal Road Resident	Painted Rock Road Bridge Raise	57.3	58.4	58.9
R-26, Ave de la Bleu de Clair Resident	Rainbow Bend Channel Recontouring	50.8	51.6	51.7
R-27, 4880 Pembroke Dr.	Eastside and Hidden Valley Developments Flood-proofing	63.2	63.8	64.9
R-28, Main Street Resident, Wadsworth NV	Wadsworth Floodwalls	62.4	63.1	64.1
R-29, 2702 Chavez Dr.	Eastside and Hidden Valley Developments Flood-proofing	71.5	72.3	72.5

Note: NA denotes that these noise-sensitive receptors are not affected by these construction activities.

While one pump station in the Truckee Meadows reach would be constructed to manage interior drainage, O&M of the project would only include periodic operation of the pump. The interior drainage pump would be electric. The pump would be run once a year for maintenance purposes to ensure operability. The interior drainage pump would also run when there are storm events with excess runoff that the regular drainage system cannot handle. The pump is designed to be less than 100 horsepower. Therefore, it is anticipated that the pump would generate insignificant noise effects.

Vibration effects associated with a large bulldozer, which generates the highest ground-borne vibration, was used to calculate potential vibration effects at each noise-sensitive receptor for the larger 2008 Alternative 3 Plan. Table 5-53 presents the calculated vibration levels at each noise-sensitive receptor. The results of the vibration effects analysis for that larger project indicate that construction-related activities would generate no effects at 14 noise-sensitive receptors and are barely perceptible effects at noise-sensitive receptors R-15, R-21, R-28 and R-29. These effects are considered to be reduced for the scaled back project proposed in the Floodplain Terrace Plan .

Alternative 2-Detention Plan

The unmitigated daytime L_{eq} noise levels ranged from 51 dBA to75 dBA under the Detention Plan . These daytime L_{eq} noise levels would be below the construction noise limits for all the noise-sensitive receptors, except for R-10, R-19, R-21 and R-22. These effects at noise-sensitive receptors R-10, R-19, R-21 and R-22 would be significant. The inclusion of portable noise barriers with the operation of stationary/quasi-stationary equipment and activities would reduce the unmitigated increases by 5 to 8 dBA. This measure or other types of noise control measures, as reflected in Section 5.15.3 Mitigation Measures, would reduce the construction noise associated with this alternative to a less than significant level.

The results of the vibration effect analysis indicate that construction-related activities will generate no effects at 15 noise-sensitive receptors and barely perceptible effects at noise-sensitive receptors R-6, R-15 and R-21, R-28 and R-29.

Table 5-53. Construction Ground Vibration Effect Analysis for the 2008 Alternative 3 Plan.

Receptor ID.	Description	Ground Vibration (VdB)	Ground Vibration (in./sec)	Human Perception	Alternative 3
R-8	420 Galletti Way	58	0.0030	No Effect	x
R-9	UNR Coop Ext	39	0.0004	No Effect	x
R-10	UNR Farms	41	0.0004	No Effect	x
R-12	4205 Perro Lane	36	0.0002	No Effect	NA
R-13	2955 Fairwood Lane	25	0.0001	No Effect	NA
R-14	4341 Hidden Valley Dr	25	0.0001	No Effect	NA
R-15	1535 Rheingold Ct	72	0.0156	Barely Perceptible	x
R-19	Residence South of Painted Rock Brdg	52	0.00158	No Effect	x
R-20	4580 Mill St	39	0.0004	No Effect	x
R-21	1000 Clean Water Way	65	0.0067	Barely Perceptible	x
R-22	Reservation Road Unknown Residence	54	0.0019	No Effect	x
R-23	695 Greg St Trailer Park	30	0.0001	No Effect	x
R-24	1555 Freeport Rd #36 Sparks	36	0.0002	No Effect	x
R-26	Ave de la Bleu de Clair Resident	49	0.0012	No Effect	x
R-27	4880 Pembroke Drive	36	0.0002	No Effect	NA
R-28	Main Street Residence, Wadsworth	69	0.0111	Barely Perceptible	x
R-29	2702 Chavez Drive	69	0.0111	Barely Perceptible	X
Note: NA means that these receptors will not be impacted because they will not be near construction activities.					

The transport of construction materials, and equipment under the Detention Plan would generate daytime peak hour L_{eq} noise levels increases of 2 dBA or less when compared to existing noise levels at each noise-sensitive receptor. These noise level increases would be well below the NDOT noise policy of a 15-dBA allowable noise level increase over existing conditions. Similarly, the Detention Plan would generate a 1-dBA increase or less in peak hour L_{eq} noise levels when compared to the No Action/Without Project Alternative noise levels for 2015. These incremental changes are below the 5-dBA significance criterion threshold. The highest noise effect under the Detention Plan would occur at Receptor R-28. This effect would be less than significant and would not require mitigation.

5.14.3 Mitigation Measures

Alternative 3-Floodplain Terrace Plan and Alternative 2-Detention Plan

The following measures would be implemented to reduce noise effects. These measures would be incorporated into a Noise Control Plan (NCP) to address increased daytime noise levels as a result of project construction. The purpose of the NCP is to ensure that the contractor would implement proper noise and vibration control measures to minimize noise effects for those noise-sensitive receptors most susceptible to potential construction noise and vibration effects (primarily residential land uses). As part of the NCP, the contractor would measure pre-construction ambient noise levels and estimate construction noise levels based on the planned construction activities. The contractor would develop noise control measures based on the construction noise modeling results to ensure compliance with construction noise limits established in the EIS. The following noise mitigation measures would be implemented prior to any

construction activity:

- Appropriate level of sound attenuation would be used or constructed to meet local ordinances. Potential sound attenuation measures that could be considered include, but are not limited to, temporary sound barriers near the noise source, such as those considered in the effects analysis relative to Best Available Control Technology for stationary/quasi-stationary equipment, or otherwise placed between the source(s) of construction noise and noise-sensitive receptors, as appropriate.
- Contractor would be responsible for maintaining equipment to comply with noise standards (e.g., exhaust mufflers, acoustically attenuating shields, shrouds, or enclosures).
- If necessary, hoppers, conveyor transfer points, storage bins, and chutes would be lined or covered with sound-deadening material.

5.15 SOCIOECONOMICS

5.15.1 Affected Environment

This section describes the social and economic characteristics of Washoe County and Storey County, the cities of Reno and Sparks, the PLPT Reservation, and the immediate project area. The characteristics give baseline information on population, employment and housing, and government finance and services.

Population Characteristics

Washoe County

Washoe County's population was 421,407 in 2010. The 2010 population for Reno was 225,221 and the population for Sparks was 90,264.

Storey County

Storey County is the second smallest county in Nevada. Today, most of the county is rural or suburban, with only about 1,200 people living in Virginia City and Gold Hill. The U.S. Census recorded a population of 4,010 in 2010 for Storey County. The planned community of Rainbow Bend is located in Storey County and contains approximately 400 homes.

Pyramid Lake Paiute Reservation

In 2010, the population of the Pyramid Lake Paiute Reservation was 1,660 individuals. Fifty percent of the population resided in Wadsworth, and 15 percent resided in Sutcliffe. In 2004, the Pyramid Lake Paiute Tribe had 2,253 enrolled members.

Employment and Housing Characteristics

Washoe County

Employment for all of Washoe County was 206,736 in 2010. Per capita income in 2010 was $29,687. As of November 2012, the Washoe County unemployment rate of about 9.9 percent was higher than the national averageabout 7.8 percent, .

Of the total homes in Washoe County in 2010, mobile homes were 6 percent; 1-unit detached was 59 percent; and 20-unit plus housing was 8 percent . This is comparable to the housing breakdown of the State of Nevada. Mobile home communities in the study area include one located on the Lincoln

Highway near the crossing of Highway 427 and one located adjacent to the proposed Washoe diversion in Verdi.

In the city of Reno, management, business, science and arts jobs employ the greatest number of people at 31 percent. Sales and office occupations are next at 27 percent. Thirty-three percent of households make between $35,000 and $75,000 per year, and 23 percent make between $15,000 and $34,999 per year. The 2010 median household income in Reno was $48,895 and the per capita income was $27,714.

Approximately half of Reno's housing stock is single-family dwellings built since the 1950's, most before 1990. According to the 2010 U.S. Census, approximately 51 percent of people rent and 49 percent own. In 2010, there were 99,329 housing units, with 10 percent vacancy.

In 2011, the median household income in Sparks was $50,568. Management, business, science and arts jobs were the largest occupational category with over 30 percent of Sparks' workforce. Sales and office occupations were 28 percent of the city's workforce, while service occupations were 22 percent.

In 2011, there were more than twice as many single-family units as there were multi-family units in Sparks, comprising about 66.4 percent of the city's housing stock. Multi-family dwelling units represented about 27 percent of the city's housing stock during that same year.

Storey County

Mining has given way to tourism as the leading component of the Storey County's economy. According to the U.S. Census, the employed population of Storey County in 2010 was 1,961. There were approximately 1,990 housing units in Storey County and the median household income $65,525. The average per capita income was $31,079. In November 2012 the unemployment rate of 10.2 percent in Storey County was above the national average . Storey County's Economic Development department has initiatives that help support over 800 businesses in Storey County and have aided in the creation of over 4,000 jobs in the county. The Tahoe-Reno Industrial Center has generated the greatest increase in jobs. The Center has a total of 30,000 developable acres.

Pyramid Lake Paiute Reservation

Much of the economy on the Pyramid Lake Paiute Reservation is based on fishing and recreational activities at Pyramid Lake. In 2006-2010, the PLPT members on the Reservation had an unemployment rate of 11 percent, compared to 13 percent of adults statewide. The unemployment rate only includes adults who are actively looking for work. Thirty-eight percent of adult PLPT members on the Reservation were not in the labor force, compared to 35 percent of adults statewide. The 2010 median household income on the Reservation was $34,821, compared to $55,726 statewide Compared to statewide employment, a substantially greater proportion of Reservation residents were employed in the following industries: agriculture, forestry, fishing, hunting and mining; education services, health care and social assistance; and public administration.In addition to permit fees for fishing, day use and overnight camping, the PLPT also receives lease revenue and tax revenue. Several tribal members belong to the Pyramid Lake Cattleman's Cooperative Association, which uses the Reservation desert open range to operate and manage the individual cattle herds.

According to the U.S. Census, there were approximately 677 housing units in the Pyramid Lake Paiute Reservation in 2010, with a 19 percent vacancy rate. Approximately 75 percent of the Reservation housing units are single family, and approximately 13 percent are mobile homes.

Public Finance Characteristics

Washoe County

Revenue for governmental needs within Washoe County is generated from general property taxes, State sales taxes, and direct levies on the gaming industry. Local government revenue comes from State sales tax and local property taxes. According to the Nevada Department of Taxation, Washoe County has a 7.725 percent sales and use tax (State of Nevada, 2010). The 2010/2011 general property tax for Washoe County ranges from $3.6458 to $3.6463 for Reno, and from $3.6163 to $3.6168 for Sparks, and $2.7002 for rural Washoe County, per $100 of assessed valuation (Washoe County, 2010b).

Storey County

Less than 8 percent of Storey County's area is controlled or managed by the Federal government. This is the smallest percentage of any Nevada county (NNDA, 2004). State government revenues come primarily from gaming taxes. In the State of Nevada, all general property taxes are collected by the county tax collectors and remitted to each participating local government according to the imposed tax rate of the local government. According to the Nevada Department of Taxation, Storey County has a 7.6 percent sales and use tax (State of Nevada, 2010).

Pyramid Lake Paiute Tribe

The PLPT has a government-to-government relationship with the Federal government. As a result, the PLPT contracts with or receives grants directly from Federal agencies or the State of Nevada, to provide services to the Tribal members and residents of the Reservation. The revenue generated by the PLPT is used to support local Tribal government activities and to supplement the programs that provide direct services to the Tribal members or residents.

Public Services

All necessary public services including broadcasting, electricity, gas, waste management, water services, and education are available in Washoe and Storey Counties, the Cities of Reno and Sparks, and the Pyramid Lake Paiute Reservation.

Electricity and gas services in Washoe and Storey Counties are provided by NV Energy, which serves northern Nevada and northeastern California. The Washoe County Solid Waste Management Program oversees all solid waste matters within the County, including monitoring waste collection and disposal, and landfill and transfer station operations. The Storey County Public Works Department operates, maintains, and repairs county infrastructure systems including water and sewer. Water service in the project area is provided by the TMWA. There are nine municipal water collection and treatment systems in the TMRPA geographic area. Included in the project area are the wastewater treatment plant near Steamboat, the Tracy Power Plant, and the Glendale Treatment Facility. Water service in the project area is also provided by the Washoe County Department of Water Resources. AT&T provides communications services, and various providers offer television service, including Comcast.

Public utilities and service systems in the PLPT are provided by the Public Utilities District, which includes a solid waste program and a water and sewer program. The Pyramid Lake Public Utilities provides drinking water for the communities of Sutcliffe, Nixon, and Wadsworth. They have a total of five wells, four pump houses, and four water storage tanks. They also have fire hydrants, gate valves, and water lines.

There are 94 schools in the Washoe County district—63 elementary schools, 14 middle schools, 13 comprehensive high schools, and 4 specialized schools, (Washoe County School District, 2012). The

Storey County School District has a total of four schools. All of these schools, except for one elementary school in Sparks, are in Virginia City along with the school district office.

5.15.2 Environmental Consequences

This section evaluates the potential effect of the proposed alternatives on the socioeconomic conditions in the project area.

Significance Criteria

Adverse effects on socioeconomics were considered significant if implementation of an alternative plan would result in any of the following:

- Induce substantial population growth in an area, either directly or indirectly.
- Displace substantial numbers of existing people or housing, resulting in the construction of replacement housing elsewhere.
- Substantially reduce employment opportunities or income levels in the area.
- Have the potential to affect a public service provider's or school's ability to continue to provide a level of service that meets established standards for the designated service area.

No Action Alternative

Forecasts for future without-project conditions indicate that Reno and Sparks will continue to grow at a rate of about 1.4 percent per year. It is assumed that additional redevelopment of the downtown Reno area will continue and that development will include flood proofing from the FEMA 100-year event. Truckee Meadows is expected to develop in areas outside the flood plain. Pressure to develop the area closer to the Truckee River will continue to be abated by local ordinances that require that there be no net loss of flood storage in the Truckee Meadows area.

Based on a projected population of 590,490 for Washoe County in the year 2030, the average annual growth rate is 1.32 percent. The per capita income projected for the year 2030 is $103,178 (2004 dollars).

The age distribution of the population is expected to change over the next two decades. The continued aging of the baby boomers will cause a decrease in the working group (ages 20 to 64) and an increase in the retired group (ages 65 and older).

According to the Washoe County Department of Community Development, employment for all of Washoe County is projected to grow to 392,244 in 2030, at an average annual growth rate of 1.4 percent. Services industries are expected to continue dominating Washoe County's employment base, adding an estimated 51,216 jobs by the year 2030. Proportions of employment by industry sectors are projected to remain stable from 2010 to 2030. An increase is seen in Construction, up from 7 to 9 percent, while the Manufacturing sector suffers a slight decline, from 6 to 4 percent. The industries that represent the largest percentage of total employment in 2030 are Services, Finance, Insurance and Real Estate (FIRE), and Government. The largest numeric increase is in the Services sector, up 48,784 jobs, followed by FIRE, with an increase of 17,273 jobs.

By the year 2030, the city of Reno population is expected to increase to approximately 339,500 and the population of Sparks is forecast to grow to 127,849. The Nevada Small Business Development Center has estimated that the population of Storey County will increase to 6,023 by 2025.

Under the No Action Alternative, the current population and employment trends would continue as projected. The levels of service provided by the public service sector would continue as indicated in the City and County General Plans. Additionally, there would be no relocation of residents out of the flood plain.

The No Action Alternative could reduce employment opportunities and/or income levels in the Truckee Meadows reach because flooding would continue to threaten homes and businesses. The No Action Alternative would also affect a public service provider's or school's ability to provide a level of service that meets established standards when a flood occurs. The moratorium for building in the floodplain would continue, but that would still not provide a solution for existing threatened homes and businesses. Finally, the No Action Alternative could also displace substantial numbers of people during future flood events.

Alternative 3-Floodplain Terrace Plan

The Floodplain Terrace Plan would reduce damaging flood events in the Truckee Meadows reach. In addition, recreation features would be constructed at various locations on the river.

Construction of project features would temporarily generate a substantial increase in employment opportunities in the region, as well as generate additional revenue for goods and services needed by construction workers relocating to the area, resulting in a beneficial effect.

Truckee Meadows Reach

The primary flood risk management features in the Truckee Meadows reach for the Floodplain Terrace Plan are setback levees, floodwalls, and floodplain terracing, which would reduce the chance of occurrence of a damaging flood event to at least 2% in the Truckee Meadows reach. Construction of flood risk management features along the alignment in the Truckee Meadows Reach would affect several existing structures, possibly requiring them to be modified or removed as part of the project. These relocations are described in further detail below. Reductions in the base (FEMA's 100-year) floodplain as a result of this alternative occur only in areas that are currently developed, and existing local ordinances strictly regulate further development in the base floodplain. Therefore, this alternative would not directly or indirectly support development in the floodplain or induce growth in the community.

Permanent relocation of buildings would be avoided where possible. However, the current alignment affects several existing structures, which may require modification or relocation, resulting in a significant effect. Potential relocations would include: 2 commercial and 3 warehouse structures in the Sparks industrial area; 6 commercial structures in the North Edison Way Business Park; Sagewinds facilities; 1 residential/farm structure on Mill Street (Ferrari Farms); and 2 outbuildings on the Grand Sierra Resort property.

Although anticipated to result in effects to residents and businesses during relocation processes, the residential and commercial relocations described above would not displace substantial numbers of existing people or housing, and would not substantially reduce employment opportunities or income levels in the project area. As described above, an analysis on the availability of replacement housing was recently performed by Property Specialist, Inc., a TRFMA consultant. The analysis concluded that there is sufficient property available to relocate displaced property owners that live or operate businesses within the project area.

All residential and commercial buildings being displaced would be purchased at fair market values. Standard relocation assistance would be provided in compliance with the Federal Uniform

Relocation Assistance and Real Property Acquisition Policies Act of 1970 (as amended), Title 49–Code of Federal Regulations–Part 24, and Title VI of the Civil Rights Act (42 US Code 2000d, et seq.). Overall, flood risk management features for the Floodplain Terrace Plan would not induce substantial population growth, displace substantial numbers of existing people or housing, substantially reduce employment opportunities or income levels, or affect public service standards.

Recreation features in the Truckee Meadows reach include installation of picnic sites, group shelters, fishing sites, trails, a parking lot, and a restroom facility west of McCarran Boulevard. Recreation features for the Floodplain Terrace Plan would not induce substantial population growth, displace substantial numbers of existing people or housing, substantially reduce employment opportunities or income levels, or affect public service standards.

Overall, socioeconomic effects in this reach would be less than significant for this alternative.

Lower Truckee River Reach

Flood risk management features in the Truckee Meadows reach could induce an increase in peak flow in the Lower Truckee River reach. During the modeled 1% chance event, this alternative would cause a change in Truckee River flows below Vista up to 1,520 cfs, depending on location, relative to modeled baseline conditions. This increase would not effect existing structures and facilities. Affected areas include parcels that are either agricultural or have no identified beneficial use. These changes in depth, duration, and frequency of flooding may represent a taking, depending on the extent of change from existing conditions. The most likely takings action would be purchase of a flowage easement on the affected lands by the non-Federal partner. However, these increased flows would not affect population growth, substantially reduce employment opportunities or income levels, or affect public service standards. Overall, socioeconomic effects in this reach would be less than significant for this alternative.

Alternative 2-Detention Plan

The effects associated with the Detention Plan would be similar to those discussed for the Floodplain Terrace Plan , including the relocation of buildings along Mill Street. The flood risk management work in the Truckee Meadows reach would affect people in agricultural and industrial business sectors, as well as some residents. Any work in the ditches would temporarily affect farmers who depend on them as water sources.

This alternative would require relocation or reinforcement of several utility lines in the Truckee Meadows reach. These include a 60-inch underground regional sewer line from the Reno-Sparks Wastewater Treatment plant that runs parallel to Clean Water Way and then crosses into Sparks approximately 2 miles upstream of Vista (inverted siphon under the river); overhead electrical power lines that cross the Truckee River; and, storm drainage outfalls, water lines, sewer lines, two wells, and utilities that cross along the McCarran Boulevard bridge. The socioeconomic effects would be less than significant for this alternative.

5.15.3 Mitigation Measures

Alternative 3-Floodplain Terrace Plan and Alternative 2-Detention Plan

Mitigation measures that could reduce the effect of residential and commercial relocations due to flood risk management and recreation elements are listed below:

- All buildings being displaced would be purchased at fair market value.
- Standard relocation assistance would be provided in compliance with the Federal Uniform

Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

- Contractors would be required to coordinate with public service providers prior to initiation of construction.

5.16 ENVIRONMENTAL JUSTICE

5.16.1 Affected Environment

"Environmental justice" is the fair treatment and meaningful involvement of all people – regardless of race, color, national origin, culture, education, or income – in the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no racial, ethnic, or socioeconomic group should bear a disproportionate share of adverse effects as a result of the execution of Federal, State, local, and tribal environmental programs and policies (FEMA, 2007). Meaningful involvement means that:

- Potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that affect their environment or health.
- The public's contribution can influence the regulatory agency's decision.
- The concerns of all participants are considered in the decision-making process.
- Decision makers seek out and facilitate the involvement of those potentially affected.

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," February 1994, requires each Federal agency to consider environmental justice issues in its programs and policies. Each agency is required to address disproportionate adverse effects of its activities on minority and low-income populations. In compliance with this Executive Order, USACE evaluated the potential effects of the alternatives on any minority and/or low-income populations in the project area.

As described in Chapter 1, the study area includes the Truckee River watershed in the States of California and Nevada. The primary focus of the study is along the Truckee River and its tributaries. The population of the project area was analyzed by racial demographics and poverty level statistics produced by the most recently available U.S. Census data. Census tracts within the project area are shown in Figure 5-11.

Racial and Ethnic Minority Populations

Racial and ethnic minority populations are defined as American Indian and Alaska Native, Asian, black or African American, Hispanic or Latino, and Native Hawaiian and Other Pacific Islander. The project area does include racial and ethnic minorities (U.S. Census, 2010b).

Table 5-54 shows the total population and corresponding percentage of minorities in Reno, Sparks, the Pyramid Lake Paiute Reservation, Washoe County, and Storey County in 2010. The population of Reno consisted of 77.8 percent white, 3.8 percent black, 2.2 percent Native American, 7.9 percent Asian, 1.1 percent native Hawaiian or Pacific Islander, and 24.3percent Hispanic/Latin people (U.S. Census, 2010b). In Sparks, the population consisted of 77.9 percent white, 3.6 percent black, 2.1 percent Native American, 7.3 percent Asian, 1.1 percent native Hawaiian or Pacific Islander, and 26.3 percent Hispanic/Latino. At the Pyramid Lake Paiute Reservation, the population consisted of 21.5 percent white, 76.7 percent Native American, 0.4 percent black, 0.4 percent Pacific Islander, 0.6 percent Asian, and 6.9 percent Hispanic/Latino (U.S. Census, 2010b). In Washoe County, the 2010 population consisted of 76.9 percent white, 2.3 percent black, 1.7 percent American Indian and Alaska Native, 5.2

percent Asian, 0.6 percent Native Hawaiian and Other Pacific Islander, and 22.2 percent Hispanic or Latino. In Storey County, the 2010 population consisted of 92.1 percent white, 1 percent black, 1.6 percent American Indian and Alaska Native, 1.6 percent Asian, 0.4 percent Native Hawaiian and Other Pacific Islander, and 5.7 percent Hispanic or Latino.

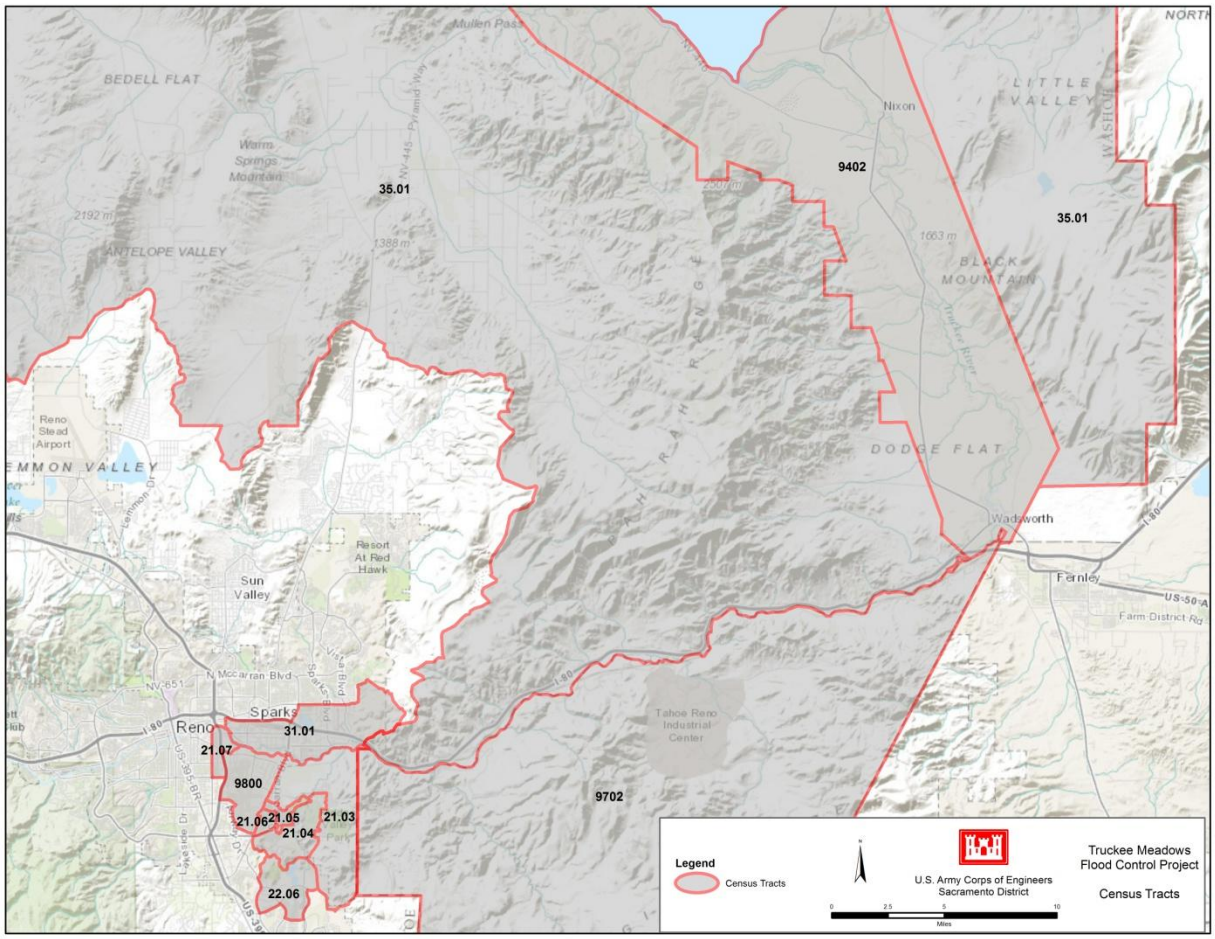


Figure 5-11. Census Tracts Within the Project Area.

Table 5-54. Minority Population in the Project Area (2010)

Area	2010 Total Population	2010 Minority Population
Reno	225,221	22.2% (49,899)
Sparks	90,264	22.1% (19,955)
Pyramid Lake Paiute Reservation	1,654	79.5% (1,311)
Washoe County	421,407	32.1% (135,079)
Storey County	4,010	7.9% (317)

Source: U.S. Census, 2010b.

Table 5-55 shows the total population and corresponding percentage of minorities in the census tracts within the project's area of effect in 2010.

Table 5-55. Minority Populations in the Project Area Census Tracts (2010)

Census Tract (predominant jurisdiction)	2010 Total Population	2010 Minority Population	Difference From Minority Population (City)	Difference From Minority Population (Washoe County)
21.03 (Washoe County)	2,659	15.5% (411)	NA	-16.6%
21.04 (Reno)	3,113	15.9% (494)	-6.3% (Reno)	-16.2%
9402 (Pyramid Lake Paiute Reservation)	1,650	79.5% (1,311)	NA	+47.4%
21.05 (Reno)	4,291	28.0% (1,203)	+5.8% (Reno)	-4.1%
9702 (Storey County)	4,010	7.9% (317)	NA	-24.2%
21.06 (Reno)	3,316	24.3% (805)	+2.1% (Reno)	-7.8%
21.07 (Reno-Sparks Indian Colony)	1,621	51.4% (833)	+29.2% (Reno)	+19.3%
31.01 (Sparks)	4,395	27.3% (1,198)	+5.2% (Sparks)	-4.8%
35.01 (Washoe County)	4,205	19.3% (811)	NA	-12.8%
9800 (Reno)	217	22.1% (48)	-0.1% (Reno)	-10.0%
22.06 (Reno)	6,400	23.5% (1,506)	+1.3% (Reno)	-8.6%

Source: U.S. Census, 2010b.

The census tracts that include the Pyramid Lake Paiute Reservation (tract 9402) and the Reno-Sparks Indian Colony (tract 21.07) include minority populations that make up more than 50 percent of the total population. These percentages are substantially greater than the minority population percentage of Washoe County.

Minority populations make up between 15.5% and 28% of the total population within the other census tracts; however, these minority percentage populations are equal to or lower than the Washoe County percentage.

Low-Income Populations

Low income populations are based on the Department of Health and Human Services poverty guidelines. The project area does include low-income individuals/families (U.S. Census, 2011).

Table 5-56 shows the estimated population percentage below the poverty level in Reno, Sparks, Pyramid Lake Paiute Reservation, Reno-Sparks Indian Colony, Washoe County and Storey County in 2011 (U.S. Census, 2011).

Table 5-56. Poverty Status for Individuals in the Project area (2011)

Area	Individuals

Reno	20.5%
Sparks	24.9%
Pyramid Lake Paiute Reservation	34.0%
Reno-Sparks Indian Colony	36.6%
Washoe County	21.7%
Storey County	18.0%

Source: U.S. Census, 2011.

Table 5-57 shows the percentage of low-income individuals in the census tracts within the project's area of effect in 2011.

Table 5-57. Poverty Status for Individuals in the Project Area Census Tracts (2011)

Census Tract (predominant jurisdiction)	Individuals	Difference From Poverty Status (City)	Difference From Poverty Status (Washoe County)
21.03 (Washoe County)	11.8%	NA	-9.9%
21.04 (Reno)	12.3%	-8.2% (Reno)	-9.4%
9402 (Pyramid Lake Paiute Reservation)	31.2%	NA	+9.5%
21.05 (Reno)	18.4%	-2.1% (Reno)	-3.3%
9702 (Storey County)	18.0%	NA	-3.7%
21.06 (Reno)	32.3%	+12.3% (Reno)	+10.6%
21.07 (Reno-Sparks Indian Colony)	19.8%	-16.8% (Reno-Sparks Indian Colony)	-1.9%
31.01 (Sparks)	17.8%	-7.1% (Sparks)	-3.9%
35.01 (Washoe County)	44.5%	NA	+22.8%
9800 (Reno)	0.0%	-20.5% (Reno)	-21.7%
22.06 (Reno)	9.7%	-10.8% (Reno)	-12.0%

Source: U.S. Census, 2011.

The Pyramid Lake Paiute Reservation census tract (tract 21.06) and census tract 35.01 are the only areas with project effects that have poverty status percentages above Washoe County's.

5.16.2 Environmental Consequences

This section evaluates the potential effect of the proposed alternatives on the environmental justice in the project area.

Significance Criteria

CEQ guidance provides relevant thresholds for identification of environmental justice effects to the extent practicable when determining whether environmental effects are disproportionately high and adverse (Council on Environmental Quality 1997:26–27).

- Whether there is or would be an impact on the natural or physical environment that significantly and adversely affects a minority population, or low-income population. Such effects may include

ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment.

- Whether the environmental effects are significant and are or may be having an adverse impact on minority populations, or low-income populations, which appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group.
- Whether the environmental effects occur or would occur in a minority population or low income population affected by cumulative or multiple adverse exposures from environmental hazards.

Census Tracts with Environmental Justice Considerations

The following census tracts within the project's area of effect contain a higher percentage of minority and/or low-income populations when compared to those of Washoe County:

- Census tract 21.07 (Reno-Sparks Indian Colony)
- Census tract 21.06 (South of Boynton Slough-West of McCarran Blvd.)
- Census tract 35.01 (Rural Washoe County)
- Census tract 9402 (Pyramid Lake Paiute Reservation)

No Action Alternative

As discussed above, the project area includes ethnic minorities and low-income individuals/families within all of the project reaches. Without implementation of a Federal flood risk management project, flooding would continue to affect all populations living along the Truckee River, with the Reno/Sparks area being exposed to the potential for the greatest amount of economic damages. Under the No Action alternative, while the Reno/Sparks area currently faces the highest risk of realizing economic damages from flooding, the risks would not change throughout the project area when compared to existing conditions. Therefore, the No Action Alternative would not have a disproportionate adverse effect on ethnic minorities or low-income individual/families.

Alternative 3-Floodplain Terrace Plan

<u>Truckee Meadows Reach</u>

Within this reach, Alternative 3 features are located in census tracts 31.01, 9800, 21.07, and 21.03. In addition, this alternative would increase floodplain water surface elevations at the 1% ACE up to 0.6 feet on parcels within census tracts 21.04, 21.05, and 21.06.

Flood risk management features proposed on Reno-Sparks Indian Colony land (census tract 21.07) would reduce the risk of damages from flooding, therefore this population would benefit from the flood project.

As shown in Figure 3-2, the depth of the 1% ACE (1/100 annual chance event) floodplain for this alternative would increase slightly in census tract 21.06. Although the change in depth, duration, and frequency of this induced flooding was not substantial enough to warrant hydraulic mitigation as part of this project, USACE requirements that the non-Federal partner participate in the NFIP would necessitate action by the non-Federal partner to bring this area into compliance with NFIP regulations, as discussed in Chapter 3. However, Figure 3-3 shows that similar effects occur on neighboring census tract populations that do not have minority or low-income populations greater than the county average,

demonstrating that effects experienced by census tract 21.06 populations do not appreciably exceed effects experienced by the general population. In the long-term, compliance with NFIP requirements by the non-Federal partner would mitigate for induced flooding effects generated by this alternative.

This alternative would not have a disproportionate effect on minority or low-income populations in the Truckee Meadows reach. Therefore, environmental justice effects would be less than significant.

Lower Truckee River Reach

Alternative 3 would induce an additional 1,520 cfs flow above the existing 1% occurrence flow. Current analysis indicates that, while these flows may induce flooding in some agricultural and uninhabited parcels, no structures or residences would be affected. Those parcels that may experience a change in the depth, duration, and frequency of flooding as a result of the project will be evaluated in PED to determine if the change is great enough to warrant a taking of the parcel. Preliminary model results indicate implementation of the project should only require the purchase of a flowage easement with no effect to the current use of the parcels. Therefore, adverse affects to communities, including low-income and minority populations, in the Lower Truckee River reach would be less than significant, including those parcels on census tract 35.01 and census tract 9402.

This alternative would not have a disproportionate effect on minority or low-income populations in this reach. Therefore, environmental justice effects would be less than significant.

Alternative 2-Detention Plan

Truckee Meadows Reach

This plan also includes the same flood risk management features on the Reno-Sparks Indian Colony lands, which would provide flood risk reduction benefits to census tract 21.07. In addition, construction of detention basins at UNR Farms and Huffaker Hills would avoid the induced flooding effects experienced by populations in census tract 21.06 from Alternative 3.

Construction of levees along Boynton Slough would affect the visual resources along the northern boundary of census tract 21.06. However, similar structures would be constructed in neighboring census tracts along Boynton Slough that do not have substantially greater minority or low-income populations compared to county percentages, and implementation of mitigation discussed in Section 5.11.3 for aesthetic resources would ensure effects to aesthetic resources in this area would be less than significant. Therefore, this alternative would not have a disproportionate effect on minority or low-income populations in this reach. Effects on environmental justice related issues would be less than significant.

Lower Truckee River Reach

The Detention Plan would have an environmental justice effect similar to that described for the Floodplain Terrace Plan in this reach. The Detention Plan would not have a disproportionate adverse effect on ethnic minorities or low-income individuals/families. Therefore, the effect is less than significant.

5.17 PUBLIC HEALTH AND SAFETY

5.17.1 Affected Environment

Washoe and Storey Counties, the Cities of Reno and Sparks, and the Pyramid Lake Paiute Tribe (PLPT) provide necessary public services to ensure the health and safety of their residents. These public services include police and fire protection, emergency medical services, and natural disaster plans and

response. Public health and safety concerns for the project area include vector control, potential for bird-aircraft strike hazard, and risk of wildland fires.

Police Protection

The Cities of Reno and Sparks have their respective fire and police departments servicing their city boundaries and SOI. Washoe and Storey Counties provide sheriff departments that are responsible for law enforcement in their respective counties.

The City of Reno Police Department currently operates out of a centralized police station with an additional three storefront substations. Recent expansions to the City's political boundaries have resulted in new areas requiring City police service, particularly in the northwest and southern geographic areas. The City of Sparks has one centralized police station and five fire stations serving 38 square miles within the city limits.

The Washoe County Sheriff's Office is responsible for all law enforcement patrol duties in the unincorporated area of the county, the service of civil process, records retention, issuing concealed weapons permits, court security, forensic investigation, criminal investigation, and all search and rescue functions within the county. The Patrol Division of the Washoe County Sheriff's Office is responsible for all law enforcement duties within the 6,700-square mile unincorporated area of Washoe County. The Patrol Division has two distinct areas of responsibility. Valley Patrol encompasses law enforcement duties in and around Truckee Meadows and Incline Village. In addition, two deputies are assigned to serve the citizens in the Gerlach-Empire area, 110 miles north of Reno. The Washoe County Sheriff's Office is also responsible for operating the only adult detention facility for pre-trial detainees within Washoe County (Washoe County Sheriff's Office, 2005).

The Storey County Sheriff's Office deputies patrol all areas of Storey County and have jurisdiction to act in any area of the county. Calls to 911 are routed to the county dispatch center, which is located at the jail facility in Virginia City. The Storey County Sheriff's Office assigns deputies to patrol designated districts of the county to ensure complete law enforcement coverage of the area. During their patrol, deputies are all responsible for traffic safety, emergency response, criminal investigations, and animal control. Patrol deputies also respond to alarms, provide bank escorts, supply escorts for probation officers, and act as couriers between district courts (Storey County, 2007b).

Fire Protection and Emergency Medical Services

The Cities of Reno and Sparks have their respective fire departments servicing their city boundaries and SOI. Washoe and Storey Counties also provide fire and emergency service throughout their respective counties. Within the Pyramid Lake Paiute Reservation, the Nixon community provides a medical clinic, elder services, police department, judicial services, and volunteer fire department.

The City of Reno Fire Department currently operates 13 stations throughout the City's SOI. These stations provide a four-minute response time to most of the city. The City has identified a four-minute response as the preferred standard of service for areas of intense urban development, such as the downtown, residential uses with 21 or more units per acre, or development with hazardous occupancies (high fire loads or explosion potential). Response times of four to six minutes can be suitable for most types of residential or commercial uses (City of Reno, 2007c).

The City of Sparks has five fire stations serving 38 square miles within the city limits. The Sparks Fire Department serves the community with intermediate life support engine companies that allow firefighters to provide significant life saving skills. The fire department provides first response from each fire station, each with a crew of three to four. Advanced life support and transports are provided by a

contracted private company under the direction of the Regional Emergency Medical Services Authority (REMSA) (City of Sparks, 2007).

Fire service to the unincorporated areas of Washoe County within the project area is currently provided by the Truckee Meadows Fire Protection District, Sierra Fire Protection District, and several volunteer fire stations located within the unincorporated area within Washoe County. The Truckee Meadows Fire Protection District operates eight stations, the Sierra Fire Protection District operates four staffed stations and five volunteer stations, and three additional volunteer stations serve the northern half of Washoe County, including Sutcliffe.

The Storey County Fire Department provides emergency medical services throughout Storey County. Firefighters and emergency medical service personnel are the first responders to an accident, call for emergency aid, and other incidents requiring immediate medical attention. Storey County emergency medical personnel provide 24 hours-a-day advanced life support and pre-hospital emergency medical care for the entire population of Storey County. They operate four ambulances and provide lifesaving care for patients prior to their transport to the local hospitals. Because of the topography and rural Nevada setting, they are frequently required to use air services, Care Flight or Cal Star, to transport patients (Storey County, 2007c).

The two largest hospitals in Reno are Saint Mary's Regional Medical Center, located at 235 West Sixth Street, and Renown Regional Medical Center, located at 1155 Mill Street. Saint Mary's Regional Medical Center operates three urgent care centers in Reno. Renown Regional Medical Center operates the Renown South Meadows Medical Center at 10101 Double R Boulevard, as well as four urgent care centers in Reno and one in Sparks. The main office of the REMSA is located in Reno at 450 Edison Way. The REMSA encompasses both the cities of Reno and Sparks, as well as their SOI in the Truckee Meadows region, providing ambulance and helicopter service.

The Veterans Administration Sierra Nevada Health Care System, Reno, Nevada, provides primary and secondary care to veterans over a large geographical area that includes 21 counties in northern Nevada and northeastern California. The Pyramid Lake Tribal Health Clinic at 705 Highway 446, Nixon, Nevada, is located on the Pyramid Lake Paiute Reservation and provides community-based public health promotion and disease prevention activities to the community.

Natural Disaster Plans and Response

The Washoe County Emergency Management and Homeland Security operates on a regional level and partners with several other local emergency response agencies to provide preparedness, response, mitigation, and recovery services for the County. The Regional Emergency Operations Center is located at 5195 Spectrum Boulevard in Reno. This emergency center serves Washoe County, Reno, and Sparks as a single, permanently established, ready-to-operate location to perform individual and/or integrated emergency response services in support of jurisdictional emergencies or larger regional emergencies and disasters involving two or more jurisdictions. The Washoe County Emergency Management Program functions as a coordination agency during a disaster, providing such assistance as may be needed by the affected communities to safeguard life and property. The intent is to assess and address the effects of the event and use the Incident Command System as part of the National Incident Management System during the response phase (Washoe County, 2008b).

Storey County Emergency Management provides planning and coordination for the response, recovery and mitigation of natural and man-made disasters occurring within Storey County. The Storey County Emergency Management Plan provides guidance and outlines a cooperative effort among several departments and divisions of county government, including the Fire Department, Sheriff, Public Works,

Budget and Finance, Commissioners, District Attorney, Assessor, Recorder, and Clerk that work together to mitigate any actual or potential disaster or event.

The National Weather Service forecast office in Reno provides the watches, warnings, and advisories for the entire project area. Information during the response phase of an emergency is provided by the Emergency Alert System. The Emergency Alert System is the new system adopted by the Federal Communications Commission to replace the old Emergency Broadcast System and is a universal tool to route emergency messages to the public swiftly and efficiently (Washoe County, 2008b). The Washoe County Emergency Alert System also includes a Flood Warning System, which is a web-based application enabling flood hazard information to be readily available during flood events as well as for general monitoring purposes.

Vector Control

The Vector-Borne Diseases Program in Washoe County uses a number of mosquito abatement methods in the Truckee Meadows area that are considered safe to humans and the environment. The program's primary focus is to stop mosquitoes while they are still in the larval stage and easier to control with the use of mosquito fish and larvicides. The District Health Department Vector-Borne Diseases Program already concentrates abatement efforts on mosquito species that can transmit West Nile Virus. Testing for West Nile Virus on various animal species is conducted to quickly identify the virus so that control can be focused to prevent human cases of the disease. The staff of the Vector-Borne Diseases Program is also available for disease surveillance and control of various diseases including mosquito-borne encephalitis, plague, and hantavirus. The program also collects wild mammals and tests for rabies in cases of human exposure, and conducts laboratory testing for Lyme disease in ticks (Washoe County, 2008c).

The Nevada Department of Agriculture has implemented a surveillance program to monitor the reemergence and spread of West Nile Virus to assist state and local agencies in reducing the effects of this disease on humans and horses. Surveillance includes monitoring for West Nile Virus in wild and domestic horses, sentinel chicken flocks, migratory wildlife, dead corvids (crow family) and raptors, and mosquitoes throughout the state (Nevada Department of Agriculture, 2005).

Aviation Safety

RNO is located within the Truckee Meadows Reach south of the Truckee River. Across the U.S., aircraft collisions with birds and other wildlife annually cause millions of dollars in aircraft damage and may result in loss of aircraft and aircrews. Most public-use airports incorporate large tracts of open, undeveloped land that provide added margins of safety for aircraft operations. These open areas can also present potential hazards to aviation if they encourage wildlife to enter an airport's approach or departure airspace or air operations area. Constructed or natural areas, such as poorly drained locations, detention/retention ponds, roosting habitats on buildings, landscaping, wastewater treatment plants, agricultural or aquaculture activities, surface mining, or wetlands, can provide wildlife with ideal locations for foraging and breeding. Hazardous wildlife attractants on and near airports can jeopardize current and future airport operations.

The Federal Aviation Administration (FAA) is responsible for creating and enforcing Federal Aviation Regulations to enhance public safety. The USDA Animal Plant Health Inspection Service Wildlife Service (WS) mission is to provide national leadership in managing problems caused by wildlife. WS and FAA signed a Memorandum of Understanding (MOU) in 1989 in an effort to help reduce wildlife hazards to aviation and enhancing public safety. The MOU established that WS has the necessary expertise for providing technical assistance and direct management to reduce wildlife threats to aviation safety. WS conducted a Wildlife Hazard Assessment (WHA) at RNO from July 2006 to July

2007 at the request of RNO, to assess potential wildlife hazards to aviation on and within 5 miles of the airport. The WHA then served as the basis for a Wildlife Hazard Management Plan to provide procedures and management techniques to alleviate wildlife threats on and near the airport. The Wildlife Hazard Management Plan was completed in August 2008. WS has provided both pro-active and reactive wildlife damage management, at the request of RNO, to alleviate aviation threats on and around the airport. Additionally, WS overviews wildlife threats, potential attractants that may significantly draw wildlife activity toward aircraft movements, reviews airport development plans and provides technical recommendations to mitigate potential hazards.

Wildlife Strike Analysis

A review of the FAA's database, during the WHA, produced 138 recorded wildlife strikes at RNO since 1990 including 65 percent of 'unknown' species. The remainder included 15 waterfowl species; four gull species, and four bird of prey species. Of the reported strikes that included "height of strike above-ground level" roughly 55 percent of the strikes occurred under 100-feet above-ground level. A review of the FAA's database, post WHA, produced an additional 59 reported strikes (two of which reported minor damage and one that reported damage as 'uncertain') at RNO, which included 44 percent of "unknown" species. The remainder included three species of waterfowl and one gull species.

Species of Threat to Aviation Safety

Threats to aviation safety by species of wildlife throughout the 2006 to 2007 WHA, including at RNO or within the five-mile general zone, were based upon abundance, frequency, behavioral characteristics, body mass and/or seasonal trends throughout the general observations, spotlight surveys, runway surveys, and off-site surveys. Additionally, surveys are currently being conducted by the WS to provide supplementary and updated data on the wildlife hazards near RNO. The WS will utilize all available knowledge and data collected to provide technical expertise on land use decisions at or near the airport to minimize or prevent attracting hazardous wildlife.

Generally, birds with tendencies to flock together commonly or during migration periods such as waterfowl, blackbirds, corvids, gulls, shorebirds, galliformes (game birds), and songbirds generally displayed high abundance. Frequencies of occurrence were variable with birds that flocked, with peaks during the spring and fall migration, nesting periods, as well as time of day.

Waterfowl are recognized as a high-risk guild, particularly because of their size, density and weight, flocking behavior and abundance. Canada geese (*Branta canadensis*) in particular, are addressed as being high risk at RNO. Canada geese were fourth in overall runway crossings throughout the survey period and second in total numbers, which displays a relatively high frequency and high abundance. Peaks in activity for waterfowl were noted in the spring, fall, and winter months, and were attributed to migration as well as populations of resident and migratory species that utilize Truckee Meadows as a wintering area. Waterfowl are attracted to wetlands, lakes, ponds, streams, agricultural fields, and areas of short grass (particularly golf course environments).

Gulls (mainly California gulls [*Larus californicus*]) were involved in the greatest number of runway crossings throughout the survey period, displaying a high abundance and frequency of occurrences. Gulls are also considered a high risk to aviation safety, as they are abundant and frequent at certain times of the year. Peak in gull activity occurred in spring and fall months, which may be the result of migration activities. Gulls are commonly attracted to water, food, and human disturbance. As gulls are highly adaptive generalists, food can range from refuse found in and near dumpsters, waste transfer stations, landfills, and fast-food restaurants, to carrion and earthworms that come to the surface after a rain, as well as worms and other insects that become available when agricultural fields are freshly tilled. Gulls are also often observed flocking on runways and taxiways following rainstorms to feed on

earthworms that have surfaced.

Birds of prey do not typically flock together and were not observed in high abundance. Their frequency of runway crossings was observed to be moderately low, but common throughout the day. At RNO, this guild, especially red-tailed hawks (*Buteo jamaicensis*), was noted as a high level threat due to the large body mass and behavioral characteristic tendency to tower over runways in search of prey species. Birds of prey are commonly attracted to areas that have an abundance of insects, small animal populations (e.g. rodents and sparrows), open spaces, and perching structures.

Mammals, such as coyotes (*Canis latrans*), frequent the RNO area throughout the year and pose a threat to aircraft due to their size and unpredictable response toward people and aircraft movements. Other mammals, such as California ground squirrels (*Otospermophilos beecheyi*) and yellow-bellied marmots (*Marmota flaviventris*), are considered low risks to aviation safety; unfortunately, they are the most common attractants to birds of prey and coyotes at RNO.

The WHA also recognized several areas of concern that provide attractants to wildlife for foraging and hunting, nesting and loafing opportunities. The wildlife habitats at RNO during the WHA were divided into four groups; riverine, woodland, grassland and disturbed. The riverine habitat, including sloughs, located on the south eastern, eastern, and western side of the airport, was noted as a potential wildlife hazard to aircraft, attracting waterfowl and shorebirds that cross the roadways from one side to the other.

The woodland habitat, primarily Rewana Farms and Brookside Golf Course, located on the southwest and north of the airport respectively, provides foraging, nesting and roosting opportunities for various species of birds, provides habitats for rodents, and loafing/hunting opportunities for coyotes. Grassland habitat, being two fields on the northeastern side of the airport, as well as open grassy areas within the Airport Operating Area, provides loafing and feeding opportunities for Canada geese. Both the woodland and grassland habitats were considered to be areas of serious concern.

Disturbed habitat includes all paved and graveled surfaces, ditches, airport structures, and storage areas. The disturbed habitat is the most prevalent type at RNO, with most of the infield already graveled to reduce dust hazards and wildlife attractants.

Wildland Fires

According to the Conservation Element of the Washoe County Master Plan, much of western Nevada is considered a high hazard fire environment. The Sierra Front Wildfire Cooperators promotes the use of “pre-fire” activities to enhance the ability to live more safely in this high fire hazard environment, including proper vegetation management around homes and other developments, use of fire resistant building materials, and appropriate subdivision design.

5.17.2 Environmental Consequences

This section identifies and evaluates the potential effect of the proposed alternatives on the public health and safety conditions in the project area.

Significance Criteria

Adverse effects on public health and safety were considered significant if implementation of an alternative plan would result in any of the following:

- Impair implementation of, or physically interfere with, an adopted emergency-response plan,

emergency access or services, or emergency evacuation plan.

- Create a substantial increase in vector populations.
- Interfere with current vector management methods used by Washoe County or the Nevada Department of Agriculture.
- Increase the potential for wildlife hazards to aviation on and within five miles of RNO.
- Increase the risk of wildland fire within the project footprint.

No Action Alternative

Under the No Action Alternative, USACE would not implement the Truckee Meadows Flood Control Project. The police, fire, and emergency services would continue to provide services to the community and would not be adversely affected by the No Action Alternative. WS would continue to work with the RNO to ensure proper implementation of the Wildlife Hazard Management Plan to reduce wildlife hazards to aviation and ensure public safety under the No Action Alternative. Without the flood control project in place, damaging floods would continue to occur in the Reno/Sparks area at their current frequency, restricting emergency access to flooded areas and increasing demands on police and fire resources.

Alternative 3-Floodplain Terrace Plan

Truckee Meadows Reach

The primary flood risk management features in the Truckee Meadows reach for the Floodplain Terrace Plan are setback levees, floodwalls, and floodplain terracing, which would reduce the chance of occurrence of a damaging flood event to at least 2% within the Truckee Meadows reach.

Emergency Services. The proposed flood risk management features would not increase demands for fire protection and sheriff's services because they would not include new structures, such as housing or businesses, or indirectly increase housing or businesses in the Truckee Meadows reach. The proposed flood risk management features would not change the intensity of land uses in the Truckee Meadows reach; therefore, the demand for fire and sheriff's protection services under the Floodplain Terrace Plan would be the same as it is currently.

During construction, there could potentially be short-term effects to response times of the police and fire departments and emergency medical services in the vicinity of the proposed setback levees, floodwalls, and floodplain terracing activities due to the increase in construction traffic and traffic caused by detour routes. In addition, construction activities and staging areas could create additional security concerns for local police. However, road closures and detour routes would be coordinated with local transportation and public works agencies, police, fire, and emergency medical response departments to minimize the effects to traffic and circulation during construction. Also, construction site security measures would be required of construction contractors. Therefore, construction activities associated with the proposed flood risk management features would have a less-than-significant effect on emergency access and services.

Proposed setback levee and floodwall heights in the Truckee Meadows reach would obstruct the view of the water side of the setback levee or floodwall from law enforcement personnel patrolling the river corridor. Design and placement of floodwalls within this reach would be coordinated with law enforcement officials prior to construction to accommodate public safety to the extent practicable. Floodwalls would be kept to minimum heights and would adjoin levees that could be accessed by vehicles and enable observation upstream and downstream, as well as provide potential access to the

river. However, the proposed setback levee and floodwalls in the Truckee Meadows reach would still present a significant effect to patrolling law enforcement personnel.

Recreation features in the Truckee Meadows Reach include installation of picnic sites, group shelters, fishing sites, trails, parking lots, and restroom facilities west of McCarran Boulevard. The recreation measures proposed in the Truckee Meadows reach would not directly affect roadways, but could have an indirect effect with the increase in construction equipment using existing roadways that could slow or delay local traffic in the areas of construction. The effects to police, fire, and emergency services as a result of construction of the proposed recreation measures would be similar to those presented under the flood risk management features in the Truckee Meadows reach.

Vector Control. Construction activities of this plan are not expected to affect vector control conditions in this reach. However, restoration of disturbed areas following construction, including the floodplain terraces, could form depressional areas that could pool with water from runoff or periodic overtopping of terraces during flood events, presenting potential breeding habitat for mosquitos. In order to avoid and minimize this potential for increase in vector populations, post construction activities will ensure drainage patterns are maintained to reduce the possibility of standing water to the extent practicable. In addition, coordination with Washoe County and the Nevada Department of Agriculture would be maintained to ensure project features do not interfere with current vector management methods. Project effects to vector control would be less than significant.

Aviation Safety. Setback levees are proposed along Mill Street that would be located within the airport obstacle clearance area. Construction of levees just beyond the Runway Safety Area of RNO could encroach into airspace that ensures maximum safety of precision instrument landings. The airport obstacle clearance is already compromised by the existence of Mill Street. However, levees proposed in the airport obstacle clearance area would be designed to minimize their profile to reduce safety risks from aircraft aborting takeoffs. Levee heights in this reach would range from three-feet to five-feet above existing ground level. Coordination with RNO and the FAA would continue through construction, including an airspace evaluation request to the FAA to assure minimal effects to airport safety. As a result of coordination efforts with RNO and the FAA, the proposed setback levee would result in a less-than-significant effect.

Short term, construction related activities in the vicinity of the airport could act as attractants to wildlife and increase the potential for wildlife strikes by aircraft. Construction, tilling, scarifying, grading ground, and vegetation removal may uncover and increase activity of small rodents and insects that can attract birds of prey and insectivorous birds. Refuse, such as material packaging, discarded trash by workers and windblown flotsam, may also serve as a wildlife attractant at construction sites. These short-term, construction related effects to aviation safety would be reduced to less than significant with the implementation of measures identified in section 5.17.3 Mitigation Measures.

Long term effects to aviation safety as a result of this project also could occur. Buildings and structures built for recreational features and pump stations are attractive to pigeons, swallows, birds of prey, song birds, and corvids for loafing and nesting opportunities. Levees provide burrowing, foraging, nesting, and loafing opportunities for squirrels, marmots, and geese. Gently sloping smooth banks are attractive to nesting waterfowl as they can easily access water. Revegetation of disturbed areas, including the floodplain terraces, could also act as an attractant to wildlife.

In addition, potential feeding of wildlife by recreationists could persistently attract wildlife to an area and encourage habituation to human activity. Finally, refuse and refuse containers in the recreation area could be attractive to wildlife species for foraging opportunities.

In order to ensure this project's wildlife hazard effects are less than significant, measures identified in section 5.17.3 Mitigation Measures would be implemented.

Lower Truckee River Reach

While the flood risk management features in the Truckee Meadows reach could induce flows in the Lower Truckee River reach, these changes are not expected to impair responses to emergencies, substantially increase vector populations, or increase wildland fire risks. These changes would have minimal to no effect on wildlife hazards for aviation safety.

Alternative 2-Detention Plan

Truckee Meadows Reach

Emergency Services. The Detention Plan would have impacts similar to those described for the Floodplain Terrace Plan . The proposed flood risk management features would not change the intensity of land uses in the Truckee Meadows reach; therefore, the demand for fire and sheriff's protection services would be the same as it is currently. Road closures and detour routes during construction would be coordinated with local transportation and public works agencies, police, fire, and emergency medical response departments to minimize the effects to traffic and circulation during construction. Also, construction site security measures would be required of construction contractors. Design and placement of floodwalls within this reach would be coordinated with law enforcement officials prior to construction to accommodate public safety to the extent practicable. Floodwalls would be kept to minimum heights and would adjoin levees that could be accessed by vehicles and enable observation upstream and downstream, as well as provide potential access to the river. Construction activities associated with the proposed flood risk management features would have a less-than-significant effect on emergency access and services. However, the proposed setback levee and floodwalls in the Truckee Meadows reach would still present a significant effect to patrolling law enforcement personnel.

Vector Control. Construction activities of the Detention plan are similar to the Flood Terrace Plan and are not expected to affect vector control conditions in this reach. However, stored water in the detention basin could present potential breeding habitat for mosquitos. The stored water would be a temporay occurance and the would be drained immediately after peak flows. The detention basin would most likely be used only during the rainy season when vector populations are less active. In order to avoid and minimize the potential for increase in vector populations, post construction activities will ensure drainage patterns are maintained to reduce the possibility of standing water to the extent practicable. In addition, coordination with Washoe County and the Nevada Department of Agriculture would be maintained to ensure project features do not interfere with current vector management methods. Project effects to vector control would be less than significant.

Aviation. The Detention Plan would have impacts similar to those described for the Floodplain Terrace Plan . Construction of levees just beyond the Runway Safety Area of RNO could encroach into airspace that ensures maximum safety of precision instrument landings. Coordination with RNO and the FAA would continue through construction, including an airspace evaluation request to the FAA to assure minimal effects to airport safety. BMPs would be implemented to reduce potential effects as a result of wildlife strikes by aircraft to less-than-significant. Personnel on hand would be trained in observation and dispersal of threats to aviation safety. During construction, personnel would establish and maintain a current contact at RNO.

Lower Truckee River Reach

As with Alternative 3, effects to emergency response, vector control, aviation safety, and wildland fire risk as a result of Alternative 2 would be less than significant in this reach.

5.17.3 Mitigation Measures

Alternative 3-Floodplain Terrace Plan and Alternative 2-Detention Plan

There are no significant long-term effects anticipated to fire protection, emergency medical services, and natural disaster plans and response due to project implementation. However, the levees and floodwalls in both action alternatives would represent a significant effect to law enforcement activities, restricting access and patrol viewsheds of the waterside of the area. Coordination with law enforcement agencies in the design of the levees and floodwalls to mitigate these impacts would accommodate public safety to the extent practicable. There will be planning and coordination between the cities, counties, and emergency services to ensure notice of road closures, detours, and other causes of delays, to ensure the most efficient route during emergency response times.

Additionally, as detailed in a Planning Aid Letter (PAL) from WS, the mitigation measures to ensure wildlife hazards to aviation safety, once implemented, would reduce to less than significant any potential effects from flood risk management or recreation measures proposed for either action alternative. The proposed measures are outlined below.

<u>During Implementation of the Project</u>

Construction Attractants

Construction, tilling, scarifying, grading ground, and vegetation uncover and increases activity of small rodents and insects that can attract birds of prey and insectivorous birds. As attractants from construction would be expected to be minimized throughout the winter months when insects are not present, rodents are inactive, and the fall migration for avian species is past, winter months would be a favorable time for the above-mentioned construction. A Stormwater Pollution Prevention Plan (SWPPP) will provide workplace recommendations for erosion and sediment control and good house-keeping. This would include, where practical, covering open ground that may easily be noticed by birds flying overhead. Refuse, such as material packaging, discarded trash by workers and windblown flotsam, may also serve as an attraction at construction sites and must be observed and policed. Personnel on hand should be trained in observation and dispersal of avian threats to aviation safety, should large congregations gather within the project site. Additionally, personnel should establish and maintain a current contact at RNO. Notification should be made with the point of contact before implementing bird dispersal, when birds are found to pose a threat to aviation safety due to large numbers or their large body size.

Structural Design and Building Materials

Buildings and structures are particularly attractive to pigeons, swallows, birds of prey, song birds, and corvids for loafing and nesting opportunities. Building and structure will be designed, if possible, to exclude wildlife usage and avoid using building materials that provide adequate horizontal perching surface or nesting opportunities. The use of I-beams should be avoided outside where they can be used by birds to loaf and nest.

Levees provide burrowing, foraging, nesting, and loafing opportunities for squirrels, marmots, and geese. If possible, use of a material (such as gravel) that is not conducive for burrowing by squirrels and marmots on the tops of the structures, and the use of riprap on the side slopes, would deter geese from loafing/nesting and accessing the water.

River Banks

Gently sloping smooth banks are attractive to nesting waterfowl as they can easily access water.

Riprap river banks make it difficult for nesting waterfowl and their young to access water and are unattractive nesting locations. If possible, riprap material would be used along river banks to decrease the accessibility for waterfowl and shorebirds. Where possible, gentle slopes to the water's edge would be avoided. Vertical banks prevent waterfowl, and their young, from wading into and out of the water.

Re-vegetation

Re-vegetate using plant species that are unattractive to wildlife species that threaten aviation safety. Plant selection of species that are unattractive or unpalatable to wildlife species will decrease the overall attraction of the area. Choose plant species that are unattractive for foraging/hunting, loafing and nesting opportunities for avian threats to aviation safety. For example, vegetation can be selected to reduce foraging opportunities for avian threats to aviation safety. Some pathovars of fescue grasses (*Festica spp.*) are unpalatable to livestock and wildlife due to a symbiotic relationship with a fungus that proliferates a toxin throughout the plant, but may be utilized for scenic reclamation on and around airports.

To minimize hazards from airspace penetration, only shrubby plant material is being proposed for establishment within the obstacle clearance area established by the airport and the FAA.

Post-completion of the Project

Following the completion of construction and reclamation of the project, recreational land uses will be opened to the public and may require ongoing attention to potential wildlife attractants. Feeding of wildlife, refuse, and refuse containers, buildings and structures and vegetation growth will require ongoing observations to determine if new wildlife attractants are developing.

Establish and Enforce a "Zero Tolerance" Ordinance Toward Wildlife Feeding

Feeding persistently attracts wildlife to an area and encourages habituation to human activity. A "zero tolerance" ordinance should be established and enforced to prevent patrons from feeding wildlife around recreational areas, not only for the safety of aviation, but also to protect trail walkers from aggressive coyotes that have been conditioned through feeding to bully patrons until they provide them with their pet or food item. Additionally, posting educational signs for the public that outline the negative results of feeding wildlife would be beneficial. WS would be happy to provide language for the signs. Park managers and staff should be trained in wildlife attractants and mitigation techniques to reduce threats to aviation safety. Additionally, personnel should establish and maintain a current contact at RNO. Notification should be made with the point of contact before implementing bird dispersal, when birds are found to pose a threat to aviation safety due to large numbers or their large body size.

Refuse and Refuse Containers

Refuse and refuse containers are attractive to wildlife species for foraging opportunities. The utilization and access to appropriately constructed refuse receptacles that ensure that the prevention of wildlife accessing refuse is required. Lids must be kept closed and recreational areas free of refuse. Increased human activity and refuse around recreational areas are attractive to wildlife species and will require monitoring and policing. Park managers and staff should be trained in wildlife attractants and mitigation techniques to reduce threats to aviation safety. Additionally, personnel should establish and maintain a current contact at RNO. Notification should be made with the point of contact before implementing bird dispersal, when birds are found to pose a threat to aviation safety due to large numbers or their large body size.

Buildings and Structures

Regularly inspect buildings and structures to identify new or developing wildlife usage and mitigate or remove wildlife attractants immediately. Park managers and staff should be trained in wildlife attractants and mitigation techniques to reduce threats to aviation safety. Additionally, personnel should establish and maintain a current contact at RNO. Notification should be made with the point of contact before implementing bird dispersal, when birds are found to pose a threat to aviation safety due to large numbers or their large body size.

Pruning, Trimming and Mowing Vegetation

Prune, trim, and mow vegetation, depending on the time of year and desired effect to species that may threaten aviation safety. Seasonal fluctuations throughout the year affecting wildlife populations and usage within the study site may create a need for pruning, trimming and/or mowing and should be surveyed diligently. Grass should be monitored for wildlife usage as threats to aviation safety and mowed when necessary to prevent seed production. Tree canopies should be monitored for wildlife usage of threats to aviation safety and pruned/trimmed to expose roosting/loafing opportunities. Park managers and staff should monitor wildlife usage and employ habitat manipulation by pruning, trimming and mowing when necessary to reduce wildlife threats to aviation safety. Additionally, personnel should establish and maintain a current contact at RNO. Notification should be made with the point of contact before implementing bird dispersal, when birds are found to pose a threat to aviation safety due to large numbers or their large body size.

Consult with Wildlife Services on Design Changes

Consult with WS on any design changes that may attract wildlife to the study site. WS would be happy to provide any further recommendations on design changes for the project that may affect wildlife attractants or usage in the study site to reduce wildlife threats to aviation safety.

5.18 CULTURAL RESOURCES

5.18.1 Affected Environment

"Cultural resource" is a term that refers to the imprint of human occupation left on the landscape. This imprint is manifested in the form of prehistoric and historic archeology sites, and historic buildings, structures, and objects. Archeological sites consist of artifacts, plant and faunal remains, trash deposits, and many types of features. Artifacts reflect anything that was manufactured or modified by human hands. Features can include structural remains, fire pits, and storage areas. Prehistoric archeological sites are loci of human activity occurring before European contact, which was first made in the southwest with the Spanish Entrada in A.D. 1,540. Prehistoric artifacts include flaked stone tools such as projectile points, knives, scrapers, and chopping tools; ground stone implements such as manos and metates; plain and decorated ceramics; and features or facilities that include subterranean and above-ground architectural units, hearths, granaries and storage cysts, and areas of ashy anthropogenic soil known as middens that are indicative of a sustained human presence at a specific location for an extended period of time. A midden may also be a prehistoric trash dump that is full of discarded animal bones, broken artifacts and general refuse from a village site.

Historic archeological sites reflect occupation after the advent of written records. Material remains on historic archeological sites include refuse dumps, structure foundations, roads, privies, or any other physical evidence of historic occupation. Refuse consists of food waste, bottles, ceramic dinnerware, and cans. Types of historic structures include industrial facilities; roadways and bridges; and water transport or detention systems such as canals, ditches, aqueducts, pumps, and dams. Historic buildings include commercial, residential, agricultural, and ecclesiastical buildings.

There are two principal methods of locating cultural resources. Before a project is started, a records and literature search is conducted at one or more repositories of archeological site records. The search may show that an archeological or historical survey had been conducted and that some cultural resources were identified. That information may be enough to proceed with the significance evaluation stage of the project. If a conclusion was reached that no previous survey had been done or that a previous survey was either out of date or inadequate, the project cultural resources expert, usually either a historian or archeologist, will carry out a survey to determine if any cultural resources are within the proposed study area boundaries. After the precise study area has been identified, which may be smaller than the original study area, we develop the area of potential effects (APE). Before construction or other ground disturbing activities may occur, it is the agency's responsibility to fully inventory all cultural resources within the APE, and evaluate for National Register of Historic Places (NRHP) eligibility all cultural resources that could potentially be affected by the project.

Regulatory Setting

After a cultural resource(s) has been identified during a survey or record and literature search, the Federal agency overseeing the project begins the process to determine whether the cultural resource is eligible for listing in the NRHP. Section 106 of the National Historic Preservation Act of 1966 as amended, mandates the evaluation process. The Federal regulation that guides the evaluation process is 36 CFR Part 800.

After a cultural resource has been determined eligible for listing in the NRHP, it is regarded the same as any other property that is listed and becomes formally known as a "historic property," regardless of age. The term "historic property" refers exclusively to NRHP listed or eligible properties.

For a Federal project to be in compliance with Section 106, one of the following four scenarios will occur: (1) no historic properties exist in the APE; (2) in some situations there may be affects to cultural resources that may not be adverse, (3) known historic properties will be adversely affected by the project and a memorandum of agreement (MOA) or, in some circumstances, a programmatic agreement, will be executed that will guide the mitigation or resolution of adverse effects; or (4) adverse effects are not known. A PA will be executed to manage the inventory and evaluation of cultural resources and mitigation, if necessary, of historic properties.

MOAs and PAs are negotiated between the Federal agency, the State Historic Preservation Officer (SHPO), and possibly the Advisory Council on Historic Preservation. Other entities such as TRFMA, historic preservation groups, and Native American tribes may be invited to participate as concurring parties to MOAs and PAs. The Truckee Meadows Flood Control Project is in compliance with a PA that was executed on August 23, 2005 and amended on April 29, 2010. The use of a PA was pursued in 2004 because of the large scope of the projected project and the potential for the existence of a large number of cultural resources, both historic and prehistoric. The PA was developed in accordance with 36 CFR 800.14(b)(1)(ii), when effects on historic properties cannot be fully determined prior to the approval of an undertaking. The PA has been amended to authorize the City of Reno to remove and replace the Virginia Street Bridge.

Prehistory

A search of the literature shows differences in the timelines separating the various stages of the archaic cultural tradition. Table 5-56 is derived from three sources. The sequences shown in the table do not reflect any attempts at reconciling the differences between the various researchers.

Table 5-58. Chronology of the Sierra Front, Truckee Meadows, and Pyramid Lake.

<table>
<tr><th>Years Before Present</th><th>Geologic Time Period</th><th>Adaptive Strategy (Elston, 1986)</th><th>Western Great Basin Cultural Sequence (McGuire, 2002)</th><th>Northern Sierra Front/ Tahoe Basin (Elston, 1986)</th><th>Pyramid Lake (Elston, 1986)</th><th>South Truckee Meadows Cultural Sequence (Kautz & Simons 2004)</th></tr>
<tr><td>11,000 ±</td><td>Late Pleistocene/ Early Holocene</td><td rowspan="2">Pre-Archaic</td><td>Early Holocene/ Pre-Archaic</td><td rowspan="2">Tahoe Reach</td><td>Western Pluvial Lakes Tradition</td><td>Pre-Archaic /Western Pluvial Lakes Tradition</td></tr>
<tr><td>7,000</td><td>Middle Holocene</td><td>Post Mazama</td><td></td><td rowspan="2">Early Archaic</td></tr>
<tr><td>4,000</td><td>Late Holocene</td><td>Early Archaic</td><td>Early Archaic</td><td>Spooner</td><td>Blazing star/ Early Pyramid</td></tr>
<tr><td>1,500</td><td></td><td rowspan="2">Middle Archaic</td><td>Middle Archaic</td><td rowspan="2">Martis</td><td>Early Pyramid</td><td>Middle Archaic</td></tr>
<tr><td>1,300</td><td></td><td>Late Archaic</td><td>Middle Pyramid</td><td rowspan="3">Late Archaic</td></tr>
<tr><td rowspan="2">600 to European Contact</td><td rowspan="2"></td><td rowspan="2">Late Archaic</td><td rowspan="2">Terminal Prehistoric</td><td>Early Kings Beach</td><td>Late Pyramid</td></tr>
<tr><td>Late Kings Beach</td><td>Kuyui</td></tr>
</table>

Pre-Archaic Period

In the western Great Basin, the Pre-Archaic Period is identified by two contrasting projectile point traditions, the Fluted Point and the Stemmed Point Traditions (Bedwell, 1973; Justice, 2002). Overall, the defining characteristics of the Pre-Archaic Period are only found in the lithic technology. Artifacts that are representative of the culture are large bifacially flaked knives, stemmed and concave base projectile points with ground edges, crescents, steep-edged scraper planes, and miscellaneous varieties of scrapers (Simons, 1997).

Archaic Tradition

The archaic way of life is typified by reliance on an abundance of diverse resources and adaptation to a wide array of geographic settings. Over time, archaic settlements became more complex and varied in size, and held evidence of differing functions or activities. Simple subsistence strategies became more complex, as the need for scheduling human activities with resource seasonality became a necessity. Small encampments became larger settlements, and hunting bands evolved into discrete family units. An ever-expanding amount of different foodstuffs increasingly put pressure on hunter-gatherers to accurately determine the location and abundance of favored resources. Consequently, the timing of resource procurement became the determining factor in the success of a group's ability to survive.

The Truckee River study area is within a larger geographic region known as the Lahontan Basin. The basin was named because the area was once covered with water from Pleistocene Lake Lahontan. The Early Archaic was a time when the climate became more arid, with the lakes and marshes drying up. The Early Archaic sites are usually found in caves and rock shelters, and residential base camps located around lakes and near permanent water sources (Elston, 1986).

Habitation changed in the Middle Archaic. Seasonal camps and winter sites were regularly reoccupied. The appearance of seasonal camps and the winter sites suggest there was a transition in the

hunting and gathering patterns. Hunting bands were beginning to restrict their annual movement to seasonal rounds in definable territory, returning to the same location on a regular basis (Kautz and Simons, 2004).

Depending on the opinion of the author, the Late Archaic began somewhere around 1,500 years before present and lasted somewhat beyond European contact. The stage was identified as the period when the introduction of the bow and arrow replaced the atlatl and dart as the preferred hunting weapons. Reliance on small game, primarily rabbits, and plant foods increased over the Middle Archaic. Plant processing equipment became more elaborate and abundant. Reliance on water fowl and other birds is evidenced through the use of duck decoys and feathered, coiled baskets from a site on Winnemucca Lake. A wider variety of resources and ecological zones were used to their maximal extent. The expansion of the Shoshonian speaking people from California into the Lahontan Basin is thought to have occurred late in this period.

Ethnography

Two Native American tribes inhabited the study area. The Northern Paiute occupied the eastern portion of the study area while the Washoe occupied the western portion of the study area. The boundary dividing the two groups lies somewhere around Patrick, which is near the historic McCarran Ranch. The Truckee River flows through the territories of both tribes, with Lake Tahoe on the west and Pyramid Lake on the east.

The earliest widespread European contact with the Northern Paiute and Washoe Indians probably occurred in the 1830s when trappers began to exploit the area. Continued use of the immigrant trails after 1849 as a result of the Gold Rush was devastating and caused irreparable environmental and economic damage. Traditional subsistence resources were consumed for miles on either side of the immigrant trails; fuel supplies were exhausted; and water holes were drained or fouled. This over use of resources, in addition to hostilities between the native populations and immigrants, as well as European diseases against which the Washoe and Paiute had no natural defenses, was largely responsible for the decrease in Native American populations in the area.

Washoe

The Washoe territory runs from east of Sparks into California and west of Lake Tahoe. Washoe territory covers approximately 4,000 square miles and is loosely bounded by Honey Lake on the north, Smith Valley on the east, Little Antelope Valley on the south, and Kyburz on the west (D'Azevedo, 1986). The Washoe territory was open to other native groups, and there is no indication that the area was forcefully defended against invasion. Similarly, Washoe peoples would range outside of their territory during seasonal hunting and gathering. Their seasonal population movements would move as far west as the American River near Sacramento, and as far east as Pyramid Lake.

The Washoe located permanent settlements on high ground near rivers and springs, and small groups ranged in diverse and independent strategies of seasonal subsistence. The larger villages were preferentially located on large valley floors, such as Truckee Meadows with an elevation of approximately 4,500 feet, and in smaller valleys such as the upstream end of the Truckee River near Donner Lake at elevations of up to 5,500 feet (Kautz and Simons, 2004). During their hunting and gathering forays, they used temporary mobile camps. Subsistence for the Washoe depended on a large variety of predictable resources that were located nearby. Seasonal movements involved aggregations of people from different sub areas gathering at locations of predictable abundance; these locations included fish runs, acorn and pine nut harvests, rabbit and hare drives, and other communal hunts. Since the Washoe were not geographically restricted, there were no set boundaries for seasonal rounds. Each group or individual made their own choices regarding resources to be used (Kautz and Simons, 2004).

Northern (Pyramid Lake) Paiute

At the time of European contact, the indigenous people referred to as Northern Paiute were composed of several linguistically homogenous, but culturally and politically distinct, populations that occupied an enormous territory covering 70,000 square miles. Subgroups considered themselves distinct from one another and were usually referred to by the name of a food or a geographical feature. They spoke a language that is known as Western Numic, which is part of the greater Uto-Aztecan language family (Fowler and Liljeblad, 1986). The Northern Paiute group in the vicinity of Pyramid Lake was able to take advantage of the large supply of fish in the lake and in the Truckee River. Pyramid Lake is the only source of a sucker fish called cui-ui. The Pyramid Lake band of Northern Paiute referred to themselves as the "Cuiyui Ticutta", or the native Paiute term “Kuyuidökadö”, which means cui-ui eaters (Fowler and Liljeblad, 1986). The cui-ui and the LCT were important food supplies for the Cuiyui Ticutta and other Paiute bands that traveled to Pyramid Lake to join in the spring spawning runs.

The importance of fishing was reflected in temporary semi-sedentary settlement patterns during fishing season and in the complexity of fishing equipment including nets, hooks, spears, basketry, traps, and weirs. During the fishing season, the Paiutes stayed close to high value fishing locations, thereby restricting the level of mobility that was prevalent other times of the year.

History

The history of Nevada is intertwined with that of mining, the railroads, explorers, and entrepreneurs. Truckee Meadows played an important role in that history as the development of the area mirrored that of the state. As a part of the legendary American West, Nevada was virtually undiscovered and unknown to white men until the late 18th century.

The Stephens-Murphy-Townsend Party, consisting of 51 men, women, and children, left Council Bluff on May 20, 1844. Entering the territory of Nevada, the Shoshone and Paiute Indians did not hinder the expedition, and the Paiute even helped the party along their way, directing them to a river and pass. Armed with as much water as they could carry and directions to a river that would lead to a pass through the Sierra Nevada, the party traveled across a barren desert that eventually was christened the Forty-Mile Desert. After the party reached the river and mountain pass, they named the river Truckee after their Paiute guide. At the foot of the Sierra Nevada range, the party traveled through Truckee Meadows, just south of present day Reno.

Early Settlers in Truckee Meadows

Prior to the California Gold Rush, most westward migration was along the Oregon Trail to the north. However, during the Gold Rush, the Truckee route became popular, and settlements and commercial establishments grew along the trail. Settlement in the Carson Valley and Truckee Meadows began in the 1850s. Settlement in the higher mountain areas was based primarily on logging and railroad construction.

UNR was established in 1885 and opened in 1886. UNR purchased 1,100 acres of land from the Jones family and other landowners along the southern portion of the Truckee River between the city of Sparks and Steamboat Creek for an experimental agricultural station.

Transportation

In 1860, Charles William Fuller established a ferry crossing and a bridge across the Truckee River. The location of the bridge was just downstream from the present-day Virginia Street Bridge in downtown Reno. The next year, Fuller sold the enterprise to Myron C. Lake, and the site became known

as Lake's Crossing. The bridge at Lake's Crossing was washed out in 1862, but Lake rebuilt it, and the wooden bridge he erected stood at the site until it was replaced with an iron one in 1887. Lake eventually established toll roads and built a lodging house. Lake aligned himself with Charles Crocker, Leland Stanford, Mark Hopkins, and Collis Huntington, and a transcontinental line of the railroad was built through Lake's Crossing. In 1868, Lake's Crossing was renamed for a little known Civil War Union general named Jesse Lee Reno (Shown, 2004).

Railroads played an important role in the history of Truckee Meadows. The Central Pacific Railroad, the Virginia and Truckee Railroad, and the Nevada-California-Oregon Railroad helped in increasing communication, bringing in supplies, and encouraging people to settle in and around Reno and Sparks. The Central Pacific Railroad, completed in 1868 along the Truckee River, was the first transcontinental railroad and also helped establish the town of Reno. The Virginia and Truckee Railroad served the freighting needs of the Comstock mines and the towns between Gold Hill and Carson City from 1872 until 1950 when it went out of business. The narrow gauge Nevada-California-Oregon Railroad was constructed to connect Reno with the timber districts of northern California and the Pacific Northwest.

The road between Donner Summit and Wadsworth became part of the Lincoln Highway in 1915, placing much of the Truckee River corridor on the nation's first coast-to-coast highway. The Lincoln Highway left the Truckee River route at Boca where it headed north to Dog Valley and returned to the Truckee River at Verdi (NDWRP, 1996). In 1920, the Lincoln Highway became part of the Victoria Highway. When Federal highways were numbered in 1925, the Victoria Highway became U.S. 40, which followed the Truckee River corridor all the way to Reno. In 1958, U.S. 40 became I-80.

Mining

Mining is responsible for increasing the population of Nevada and for shaping several key cities including Reno, Virginia City, and Carson City. In 1851, traces of gold were discovered in the Carson River. Prospectors diverted from the depleted gold fields of California to Gold Canyon in Nevada.

Henry Comstock came to the Gold Canyon area and jumped the claim of the Grosh brothers, who had both died before being able to capitalize on their discovery of pure silver ore. Comstock also forced his way into a partnership with Peter O'Riley and Patrick McLaughlin after their discovery of silver ore in Six Mile Canyon. These claims, eventually becoming the Mexican, Ophir, and California mines, would eventually yield $60 million in gold and silver (Shown, 2004).

None of the four original owners of the Comstock Lode saw their discovery through to riches. The shares sold for as little as $3,000 and as much as $40,000, although in just a few years they were worth millions more. A dozen large mines operated in the area, heavily producing gold and silver, while about 40,000 people lived in the Comstock region. In the end, the gold and silver taken from the mines was worth more than $7 billion (Shown, 2004).

With the gold and silver rush came an increased demand for food, water, shelter, and supplies. Inns and trading posts were established in the area, and the timber industry boomed. Because of a drop in demand for silver after 1873, activity slowed at the silver mines. Nevada's Twenty-year Depression, brought on by decreased profits and activity in the mining industry, began in 1881. The state's population fell by 32 percent, but the railroad and irrigation led to continued development and growth in the Truckee Meadows area (NDWRP, 1996).

Irrigation

The first recorded appropriation of water in Truckee Meadows took place in 1858 (NDWRP,

1996). In addition to household needs, water was necessary for irrigation of crops, watering stock animals, and for gold and silver mining. A number of early ditches diverted water from the Truckee River to areas in and around Truckee Meadows.

In 1861, work began on the Pioneer Ditch, which diverted Truckee River water at a point just upstream from the present-day Greg Street Bridge, and irrigated pasturelands around the site that would become the UNR. The Cochran Ditch, constructed at the same time as the Pioneer Ditch, diverted water from the Truckee River near present-day Wingfield Park in downtown Reno to farmland south of Reno. The Orr Ditch completed in 1872, diverted Truckee River waters on the north just downstream from the site of the modern Mayberry Drive Bridge. The water was channeled east, paralleling the river for approximately 2 miles to Henry Orr's ranch. The Highland Ditch, completed in 1875, diverted Truckee River waters from just east of Verdi for the irrigation of Truckee Meadows and for Reno's municipal water supply. In 1880, the Truckee & Steamboat Irrigating Canal Company completed the Steamboat Ditch, which ran 33 miles along the western side of Truckee Meadows (NDWRP, 1996).

At the turn of the century, integrated irrigation projects were coming under consideration. Francis Griffith Newlands was a Nevada politician who drafted the National Reclamation Act that was passed in 1902 and committed the Federal Government to construct irrigation projects in the west (Glass and Glass, 1983). The Truckee-Carson Project was the first project completed under this act. Also called the Newlands Project, the Truckee-Carson Project was designed to irrigate 350,000 acres in the Carson Valley with water from the Truckee and Carson Rivers. Water from the Truckee River would be transported via a 30-mile canal that originated at Derby. The Lahontan Dam was completed in 1913 to impound these streams. However, the amount of water proved to be inadequate and the soils unsuitable for most crops, so the size of the project was reduced to 70,000 acres (Glass and Glass, 1983).

Ranching and Agriculture

Ranching and agriculture developed as a reaction to support the population increase in the area caused by the California Gold Rush and the development of mining in Nevada. The first crops raised in the area were wheat, oats, rye, barley, corn, potatoes, and hay, in addition to a variety of fruits and vegetables. Alfalfa, introduced in 1868, became an extensive forage crop along the river, and by the mid-1870s, alfalfa was the reigning staple crop of the Truckee Meadows (NDWRP, 1996).

Ranching and raising stock became a major industry. By the end of the 1850s, Truckee Meadows was a favorite winter grazing area for traveling herds of cattle and sheep. With the introduction of alfalfa and other nonnative crops, the region and ranching and agriculture continued to flourish (Simons, 1997).

Timber

The discovery of the Comstock Lode and the ensuing rush to western Nevada created a huge demand for lumber, which spurred on a large timber industry and numerous sawmills. Eastman and White operated one sawmill in the Truckee Meadows, approximately 22 miles south of Reno. One of the larger operations in the area was the Carson & Tahoe Lumber and Fluming Company which controlled more than 50,000 acres of land, and operated four sawmills two logging railroads, and a planking mill and box factory in Carson City. The company closed by 1947 due to timber depletion and reduced demand from Comstock mines.

Other Industries

Other early industries included ice harvesting, fishing, and gambling. Ice harvesting began in the Truckee area in 1868. Ice was taken from Donner Lake and an earlier, smaller Boca Reservoir. Both Indians and settlers took fish, which were plentiful before the turn of the century, from the Truckee River

and Pyramid Lake. Cutthroat trout from Pyramid Lake were shipped to San Francisco and Utah. Gambling officially became legal in Nevada in 1931, and is still an important industry today.

Between 1906 and the 1940s, Nevada was the divorce capital of the country, and Reno was the city that received the most attention from the press. Nevada was often chosen for divorce because the divorce laws were relatively lenient and because the required stay for residency was at times as little as six weeks. Guesthouses and dude ranches were established to help wealthy customers enjoy their six-week residence in Reno. The Riverside Hotel/Casino in Reno played a major role in the divorce industry. The six-week requirement brought such a rush of people to the city that some even camped along the Truckee River until rooms became available (City of Reno, 1997).

Records and Literature Search

A search of existing information for the Truckee Meadows Flood Control Project was initiated via a records and literature search from the Nevada State Museum. A second records and literature search to include the Huffaker Hills portion of the project was requested from the Nevada State Museum. The records of the Nevada SHPO in Carson City, Nevada, were searched for NRHP nominations and historic surveys within the APE on March 18 and 19, 2004, and May 5 and 6, 2004, by a USACE historian. Additional consultation with Mella Harmon, Architectural Historian at the Nevada SHPO, was conducted in Carson City and later in Reno, Nevada. USACE also consulted with Dr. Robert Kautz of Kautz Environmental Services; Colin Busby of Basin Research Associates, Inc.; Don Hardesty, professor at the UNR; and the late Gary Bowyer, BLM Nevada Field Office (located in Carson City). Dr. Hardesty was consulted because of his and his students work on the Young and Georges Ranch/Guery's House historic archeology site.

The NRHP was consulted for the entire study area, and there are 37 listed properties, all of which are historical buildings and bridges. A total of 82 cultural resources survey reports have been conducted in the study area. The cultural resources survey report of the Downtown Reno Reach, prepared earlier in the project planning phase, was consulted, and historical information on several historic properties was provided by Mella Harmon in 2004 (JRP, 2002). The records search from the Nevada State Museum revealed 31 historic period properties and 210 archeological sites recorded within the study area. The preponderance of the archeology sites were recorded for the earlier Truckee River project (Moore and Burke, 1992). All but three of the archeology sites that were recorded and tested by Moore and Burke are in the UNR Farms and Huffaker Hills locations. The results of the building and structure literature search are summarized in Table 5-57. Findings of other surveys conducted in the study area are discussed by project reach below.

Table 5-59. Records and Literature Search Results from the Nevada State Museum in or Near the Area of Potential Effects.

Property Name	NR Listed/Eligible	Year Listed
Pioneer Ditch	Recommended eligible (JRP, 2002)	
13th Crossing Truckee River Bridge (Painted Rock Road Bridge)	Eligible	1988

Truckee Meadows Reach

Prehistoric Resources

In 1990, USACE contracted with Archaeological Research Services for an earlier iteration of the Truckee River Flood Control Project to conduct an intensive survey and test excavations of the area between Highway 395 and Steamboat Creek (Moore and Burke, 1992). A more expansive area was

surveyed between Steamboat Creek and McCarran Boulevard south to Huffaker Hills. The southern portion of the survey was located between Rattlesnake Mountain and what is probably now known as Steamboat Parkway on the southern end. The southeastern part of Bella Vista Ranch between the section line west of Steamboat Creek and Mira Loma Road was not in the survey area. The APE for this contract involved 4,100 acres. However, due to problems with unsurveyable lands, lack of rights-of-entry to private property, highly disturbed land, and previously surveyed lands, the Archaeological Research Services survey covered a revised APE of 1,453 accessible, relatively undisturbed acres (Moore and Burke, 1992). The survey identified 34 new archeology sites. When combined with known sites, the total count in the APE was 78 sites. A total of 16 sites were test excavated to determine the potential for NRHP eligibility. The 16 selected sites included 8 new and 8 previously known sites. The majority of the property that was surveyed by Archaeological Research Services is outside of the current study area.

Two of the most important prehistoric archeology sites that helped define the prehistory of the Truckee Meadows are shown in Table 5-58. The three other sites were important sites that have either been excavated or obliterated from construction.

Table 5-60. Archeology Sites in the Vicinity of Truckee Meadows.

Site Number	Site Type	Condition	NRHP Eligibility
26Wa2065	Habitation	Excavated	Yes
26Wa148	Habitation	Gone	N/A
26Wa1420	Habitation	Gone	N/A
26Wa2909	Lithic Scatter	Excavated	No
26Wa3017	Habitation	Excavated	Yes

Two of the most important contributions to the understanding of the prehistory in the Reno/Sparks area were multi-component archeology sites excavated by Robert Elston for NDOT projects. The relevance to the Truckee River Flood Control Project is that they were on the north side of the Truckee River. Site 26Wa2065 is located on Glendale Boulevard, and site 26Wa3017 is located at the I-80/Vista Interchange in east Sparks.

26Wa148. This site was a Washoe settlement that existed when Reno Sparks Indian colony was established in 1917. It was recorded as being on the grounds of the old Mattingly Ranch. There is no evidence of its existence.

26Wa2909. This site consisted of 128 pieces of cultural material, including 194 chert reduction flakes, four chert bifacially flaked tools, and two obsidian flakes. It is a highly disturbed site and was determined not significant (Werner 1983). It was recorded during a survey for the RNO Expansion in 1983 and was evaluated as ineligible during consultation with SHPO.

26Wa2065 – The Glendale Site. Originally called the Painted Rock Site it is now known as the Glendale Site. This site consisted of flakes, a chert scraper, an ochre covered mano and artifacts eroding out of the banks of the drainage ditches on the grounds of the Nevada Mental Health Institute. In 1974, Nevada Department of Transportation (NDOT) then known as Nevada Department of Highways, determined that making improvements to Glendale Boulevard was their highest priority. Expansion of Glendale Boulevard required widening the road and building a new bridge over the Truckee River. Widening Glendale Boulevard required acquisition of land from the Nevada State Mental Health Institute. Ethnographic evidence suggested that the Glendale Site was originally located on both sides of the Truckee River and probably extended some distance up and down the river (Miller and Elston, 1979). The Glendale Site was occupied intermittently from the Middle Archaic to the 19th Century. One interesting artifact that was uncovered was a fragment of a rare anthropomorphic figurine. Historical period artifacts from the site were associated with the 19th Century Nevada Insane Asylum.

26Wa3017 – The Vista Site. Excavations at the Vista Site provided valuable information regarding the transition between the Martis and Early Kings Beach phases (Zeier and Elston, 1986). Also gathered from the site was important data regarding clarified regional prehistory changes in technology and subsistence which was probably related to the Numic expansion into the Great Basin. The prehistoric component of the site was most intensely occupied between A.D. 500 and European contact. The historic component of the site contained artifacts that were associated with Chinese railroad laborers, late 19th Century agricultural development, and early 20th Century urban development.

Historic Resources

A survey conducted by USACE archeological staff in 2004 indentified three historical period sites within the vicinity of the University of Nevada, Reno Main Station Field Laboratory. A later building survey that was conducted by JRP Historical Consulting in 2011 (JRP, 2011) investigated the Pioneer Ditch and two building complexes. Other properties identified earlier by other researchers are shown in Table 5-59 below.

Table 5-61. Historical Period Sites and Properties That May be Affected in the Truckee Meadows Reach.

Site Number	Site Type	Condition	NRHP Eligibility
Pioneer Ditch	Irrigation Ditch	Highly altered	Recommended eligible (JRP, 2011)
Ferrari Farm	Farmstead	Excellent	Yes
Bristlecone/ Sagewind	Building complex – formerly the Bishop Manogue High School and Brothers of the Holy Rosary residence	Highly altered	No
26Wa7957	Light historic trash scatter	Good	No
26Wa5191	Light Historic Trash Scatter (glass & Ceramics)	Gone	No
University of Nevada, Reno - Main Station Field Laboratory	22 buildings and structures	Good to Excellent	No
26Wa7958	Remnant building foundation and incinerator	Highly disturbed	No
26Wa7956	Jones Ranch	Good	Yes
26Wa4584	Jamison's station/Young and Georges property	Good	Yes
26-WA436	Early 1940s telephone Line	Removed - fallen poles, stumps, and insulators lying about.	No

Pioneer Ditch. The Pioneer Ditch was recorded on the Intermountain Antiquities Computer System and given the Trinomial number 26Wa5445. The Pioneer Ditch runs parallel to the Truckee River from a beginning point on the river immediately north of the Reno Airport and continues four miles to empty into Steamboat Creek near the TMWRF. The Pioneer Ditch has never been evaluated for listing in the National Register but it is certain to be considered eligible. Rowley (1990) stated that the four-mile-long Pioneer Ditch, completed in 1861, was the first ditch of record to divert water from the Truckee River. As a result of its primacy as a ditch of record, the Pioneer Ditch holds a superior prior right over all other diversion ditches on the Truckee. The Pioneer Ditch is still in use as an occasional source of irrigation water for the UNR Farms. In 1963, UNR started to line the Pioneer Ditch with concrete. While

the original purpose of the Pioneer Ditch was to bring water to the valley, it more recently has served another important function as a drainage ditch. Rowley noted that with the decline of farming, coupled with increased urbanization, the Pioneer Ditch has been very useful with providing drainage during periods of heavy rainfall.

Ferrari Farm - The Mill Street setback levee would require the removal of the Ferrari Family farm house which is of 1940s to 1950s era brick ranch style design. The Ferrari family has been farming in that location since 1912 (Ferrari, 2011). The floodplain terracing on the south bank of the river would require the removal of the Ferrari barn and outbuildings. The barn is substantially older than the brick farm house. The Ferrari Farm was recorded in 2011 by JRP, who recommended it as being NRHP eligible.

Bristlecone/Sagewind/Holy Brothers of the Rosary High School - The complex of buildings was the location of the first Catholic high school in Reno. The building complex has a long and varied history (JRP 2011). The property located at 1725 South McCarran Boulevard was originally built as a residence for Roberti and Morgart Flick in 1943. The Flicks moved away in 1947 and the Catholic Dioceses of Reno took over the property and installed the Bishop Manogue High School. They outgrew the property in less than ten years. In 1954, a Catholic teaching order called the Brothers of the Holy Rosary took the property over until sometime in the late 1980s or early 90s. Following the departure of the Holy Brothers of the Rosary, the non-profit Bristlecone Family Resources took over occupancy of the property to run a teenage drug treatment facility. Currently it houses an adult drug and alcohol treatment facility called Sagewind.

The East McCarran Boulevard Bridge lengthening would require recording and evaluating the Sagewinds/Bristlecone Mental Health complex. The buildings have since changed hands a few times and been physically modified. Assuming that the complex retained its original integrity it may qualify for the NRHP, but in its current state this is doubtful (Harmon, 2004; Harmon, 2011). This property was evaluated and recommended to be ineligible for the NRHP (JRP 2011).

26Wa7957 - Site 26Wa7957 is a scatter of flattened gallon cans and miscellaneous pieces of wire and lumber that is on the first terrace above the river near McCarran Boulevard.

26Wa5191- This is a light historic artifact scatter 26Wa5191 that is located east of the UNR Farm building complex.

University of Nevada, Reno - Main station Field Laboratory - This complex of 22 buildings and structures is an important component of the UNR Farms. The complex consists of a concentration of agricultural facilities, residences, and the Wolf Pack Meats butcher shop. This complex was evaluated and recommended to be ineligible for the NRHP (JRP 2011).

26Wa7958 - is a remnant concrete building foundation and an incinerator built from concrete and river cobbles.

26Wa7956 – Jones Ranch: The main historical period structures are a two-story stone creamery building dating to 1859, and an 1860 era dairy barn. Both buildings have excellent integrity.

26Wa4584 – Jamison's Station. The famous Jamison (or Jameson) Station was also researched during the UNR investigation and it was concluded that the station was most likely located near present-day Glendale from its first establishment in 1852. An 1863 General Land Office survey map indicates that a "J. Guery" had a house on the property in the approximate location of 26Wa4584. At that time the land was owned by Henry A. Young and John George, though the family of J. Guery may have lived

there. Other speculation has suggested that J. Guery and John George could be the same person, but with a slight misspelling, which is not uncommon in historic records (Buck, 2004). No other information about J. Guery was uncovered other than the evidence collected through data gathering. Investigation of the site suggests a rural domestic use of the property from the 1860s to 1900. Habitation by a family is suggested by the presence of ceramics, toys, and everyday household use items of the late 19th century. The site may have extended much further, however, the construction of the sewage treatment plant nearby would have destroyed any evidence of this (Young and George's Ranch/Guery's House, 2002).

Lower Truckee River Reach

Known archeology sites in the Lower Truckee River reach t are listed in Table 5-60.

Table 5-62. Archeology Sites Potentially Affected in the Lower Truckee River Reach.

Site Number	Site Type	Condition	NRHP Eligibility
26Wa5213	Historic trash scatter	Unknown	No
26Wa5214	Historic trash scatter	Unknown	No
26Wa5215	Historic trash scatter	Unknown	No
26Wa1601	Prehistoric lithic scatter that used to have petroglyphs on it.	Highly disturbed from Bulldozing	No

The majority of surveys that have been conducted are on the Vista, Patrick, and Fernley West Quadrangles, because they are close to the major urban centers of Reno and Sparks. As the Truckee River project moves northeast towards Wadsworth, the surveys are fewer and smaller in scale. With the exception of prehistoric site, 26Wa1601, the archeology sites are usually smaller trash scatters associated with the railroad. There are no historic structures or buildings identified in the Lower Truckee River reach.

Vista Quadrangle

Eleven separate surveys have been conducted within the limits of the Vista 7.5 Minute topographic quadrangle. Four sites were found near the river. The Court of Antiquities was recorded as 26Wa2, 26Wa35, and 26Wa43. It was also mismapped on the survey report's location map (Budy, 1979). There are two sites on the north side of the River, 26Wa5216 and 26Wa1601. Site 26Wa5216 is a small sparse, historic trash scatter, and 26Wa1601 is a large open artifact scatter with recorded petroglyphs on it. This site has been severely disturbed from bulldozing for a long abandoned housing development.

Patrick Quadrangle

Four surveys have been done within the confines of the Patrick Quadrangle. The largest survey, 227 acres, was conducted in 1993 for the Piñon Pine Power project (Ebasco Environmental, 1994). None of the sites were deemed to be significant. The area is now highly developed. Two surveys that were conducted north of the river were negative for cultural resources. The fourth survey fell onto two quadrangles: Vista and Patrick (Burke, 1990a). One small archeology site was located during that survey. The disposition of the site is unknown; a review of an aerial photograph did not reveal any development at that location.

Derby Dam Quadrangle

Eight surveys have been conducted within the Derby Dam Quadrangle. Three small archeology sites were found near the river. The sites, 26Wa5213, 26Wa5214, and 26Wa5215 are very small insignificant historic period sites associated with the railroad tracks.

Fernley West Quadrangle

Four surveys were conducted in this area. They were all negative for cultural resources. The Truckee Canal, 26LY1917, runs parallel to the Truckee River in the quadrangle.

Wadsworth Quadrangle

No surveys have been conducted in this area, and no archeology sites have been recorded.

Project Field Surveys

Between September 2004 and June 2007, USACE archeologists with contract assistance surveyed approximately 3,000 acres within the Truckee Meadows reach, the beginning of the Lower Truckee River reach, and the formerly proposed Huffaker Hills (Bella Vista Ranch) and UNR Farms Detention Basins. Geoarcheological contract work has been done in the Truckee Meadows that focused on the UNR Farms. The purpose of the contract was to determine the potential for buried cultural resources in the Truckee Meadows. Preliminary results failed to identify any significant buried cultural resources, but did note the potential for sites to exist in the APE (Young and Wriston, 2007).

Truckee Meadows Reach

In 2002 and 2012, JRP Historical Consulting Services conducted an historic building and structure survey of Downtown Reno. In 2004, USACE conducted an updated historic building and structure survey of the entire study area. Results of both efforts are recounted in the earlier Records and Literature Search section.

USACE Field Survey

The 2004 and 2007 field visits along the river between Highway 395 and Vista resulted in the identification of two historic period archeology sites, formal recordation of the Jones Ranch, and an updated study on the misnamed Jameson's Station, as discussed above (Perry, 2009). The Jones Ranch will also be recorded on State of Nevada Historic Resources Inventory Forms, by JRP in 2011.

Four isolated artifacts were found near South Rock Boulevard. East of Rock Boulevard on the Ferrari Ranch the survey team found a possible piece of fire-cracked rock. West of Rock Boulevard on the river bank the survey team found three flakes, one obsidian, one chalcedony, and chert percussion flakes. They were not associated with one another.

Jones Ranch consists of four buildings and a mobile home. The main historical period structures are a two-story stone creamery building dating to 1859, and an 1865-era dairy barn. Both buildings have excellent integrity. The other two buildings are a simple frame garage and a 1970s era house. The house is long since abandoned and in near dilapidated condition. A site record form was filled out for the complex and site number 26Wa7956 was assigned to it. In 1989, a graduate student from UNR wrote a history of the Jones Ranch and submitted the documentation for listing in the NRHP (Emmerich, 1989). A recent search of the NRHP data base on December 13, 2010 does not show the Jones Ranch as having been listed. There is high potential for buried trash deposits to be found on Jones Ranch property. An isolated flake was found on the river bank east of the Jones Ranch eastern fence line, and broken piece of a metate (milling stone) was found west of the Jones Ranch and approximately 100 meters from the Truckee River.

Two historical period archeology sites were found in the UNR Farms property. Site 26Wa7957 is a scatter of flattened gallon cans and miscellaneous pieces of wire and lumber that is on the first terrace above the river near McCarran Boulevard. Site 26Wa7958 is a remnant concrete building foundation and

an incinerator built from concrete and river cobbles. Three 1930s era soda bottles were associated with the incinerator and foundation. This site is off Clean Water Way west of the UNR Farms employee housing building.

South of the Truckee River across from the Court of Antiquities, the USACE survey team found one prehistoric lithic scatter, a site with historic trash and two utilized flakes, a piece of possible rock art, an isolated core, basalt knife, and an isolated flake. A large abandoned tank (18.6 m by 92 cm) was on the site. The tank was a large cylinder, possible for a railroad tanker car of some sort. The area along the river is highly disturbed with a large amount of intentional earth moving having taken place.

Geoarcheology Exploration

Due to the dynamic alluvial environment in the Truckee Meadows in the vicinity of the UNR Farms, a geoarcheological study was undertaken to determine the potential for buried cultural resources. Between August 28 and September 9, 2006 a team from Far Western Anthropological Research Group excavated 30 backhoe trenches up to one-and-one half meters deep. The shallow depth was determined by the high water table. The results indicate that despite the limited depth of the trenching there is still high potential for buried archeology sites. The report concluded that the subsurface distribution of cultural materials mirrored the surface distribution (Young and Wriston 2007). The larger village sites would be around the margins of the meadows, and not in the interior floodplain. Smaller, isolated campsites and processing facilities are more likely to be encountered in subsurface in the floodplain.

Prehistoric Resources

Only one prehistoric archeology site, 26Wa435, was found by the USACE survey team in the Truckee Meadows Reach. The area is highly disturbed due in large part to the railroad modifying the landscape to accommodate the railroad track and to allow the movement of water around the tracks. The location of the prehistoric lithic scatter was immediately south of highly modified and contoured ground. The modification was possibly due to the removal of Vista Reefs by USACE in the late 1960s. The tank was clearly recently put there but the two utilized flakes represent an isolated occurrence.

Lower Truckee River Reach

In 2005, USACE contracted with Far Western Anthropological Research Group, Inc to conduct a reconnaissance study of the Lower Truckee River to determine the likelihood of encountering buried cultural resources from construction and landscaping actions (Young, 2005). Table 5-61 reflects the results of Young's study and indicates the potential for site discovery in a variety of geomorphic scenarios along the expanse of the River between Vista and Wadsworth. According to the USACE Landscape Architect, landforms that will be encountered are channels and young floodplains (Lee, 2011).

The USACE survey team did not survey further east than Hafed in Storey County. In 2010 USACE contracted with Basin Research Associates, Inc., to conduct a cultural resources survey of the lower Truckee from Hafed to Pyramid Lake (Basin Research, 2010). Rights of entry were only given for properties in Washoe County between Lockwood and Wadsworth. There was no access permitted in Storey County, or on the Pyramid Lake Paiute Reservation.

In 2010, USACE archeologists conducted a negative cultural resources survey of the Ferretto Ranch on the south side of the river and west of the Painted Rock Bridge for the installation of eight groundwater monitoring wells (Perry 2010). The survey covered approximately 80 percent of Ferretto Ranch property. The remaining 20 percent will need to be surveyed. However, due to past flood events and the associated high sediment loads, there is little expectation of finding cultural resources in the ranch property in general.

Table 5-63. General Landforms of the Vista to Wadsworth Reach.

ID	Group	Characteristics	Archaeological Potential
1	Hillslopes	Steep slopes of Pah Rah and Virginia Ranges, includes tributary canyons.	Prehistoric: Low potential for buried and/or intact sites. Lithic toolstone sources may be present. Historic-era: Transportation and Mining resources may be present.
2	Fans	Early to middle Holocene sedimentary packages; late Holocene incision.	Prehistoric: Low potential for buried and/or intact sites due to high energy erosion and depositional cycles of fan formation. Late Holocene components may be present as surface sites. Historic-era: Transportation, Exploration, Early Settlement, and/or Agricultural resources may be present.
3	Old Floodplain	Primarily Pleistocene-age terraces well-above the modern river channel. Level, dissected surfaces. Intensive industrial development.	Prehistoric: High potential for intact surface sites. Moderate potential for sites buried within inset or capping landforms (e.g., dunes). Historic-era: Transportation, Exploration, Early Settlement, and/or Agricultural resources are likely.
4	Young Floodplain	Holocene-age to modern-era terraces. Level surfaces adjacent to modern channel. Lowest floodplain terrace subject to seasonal flooding. Also present as broad floodplain near Wadsworth and in the north Truckee Meadows. Often used for agricultural development.	Prehistoric: Moderate potential for intact surface and buried sites. Surface inventory may not identify sites buried within very recent landforms. Site preservation limited to environments away from active or former channel. Historic-era: Transportation, Early Settlement, and/or Agricultural resources are likely.

Native American Consultation

In 2004 the USACE project manager and project archeologist gave presentations of the project to the Washoe Tribe of Nevada and California (WTNC) Cultural Committee, and to Mr. Ben Aleck, Director of the PLPT Museum. USACE was working with the RSIC to set up a meeting at their location and convenience, however, that date was never set. A teleconference was later held in 2007 between USACE and the RSIC. USACE was represented by former District Engineer, Colonel Ron Light; Environmental Manager, Dan Artho; and Archaeologist, Richard Perry. The RSIC was represented by Tribal Chairman Arlan Melendez; The Director of the Planning Department, Scott Nebesky; and Cultural Resources Program Manager, Michon Ibon. The purpose of the teleconference was an informal discussion between the two entities with regards to the current status of the project.

Letters were sent to the WTNC, PLPT, RSIC, Carson Colony Council, Dresslerville Community Council, Stewart Community Council, and the Woodsford Community Council. Two letters were sent to each group, one on February 3, 2005, and again on August 9, 2005. The purpose of the February 3rd letters were to introduce all groups to the project, inquire if they had knowledge of traditional cultural properties and sacred sites, or archeology sites, and invite them to participate in the Programmatic Agreement (PA) as concurring parties, and offer comments on the draft PA. The August 9 letter invited all parties to sign the negotiated PA. However, to date, no tribe has signed the PA.

At the suggestion of the SHPO, USACE awarded a contract for ethnohistoric services to two Nevada-based ethnographers. The boundary between the Washoe Tribe and the Northern Paiute runs

north to south basically at the intersection of the eastern Truckee Meadows and the Virginia Mountains. Prevailing thinking says that the Truckee Meadows was exclusively the ancestral home to the Washoe; however, this concept has been challenged primarily by Northern Paiutes from both the RSIC and the PLPT. The original basis for the study was to conduct ethnographic interviews supported with ethnohistoric research to attempt to determine if one tribe had a legitimate claim to the Truckee Meadows as their ancestral homeland. Additionally, the report served to provide a higher level of consultation between USACE and the three Indian Tribes, and to determine if there are any Traditional Cultural Properties in the study area. On January 23, 2007, USACE held a meeting at the Big Bend Ranch facility in Wadsworth, Nevada to introduce members of the Washoe Tribe, RSIC, and the PLPT to the ethnographers and start a scoping process between all parties for the Ethnohistoric contract. The report was finalized in September 2010 (Lerch, et. al.2010).

The report stated that the Indian Claims Commission (ICC) pursuant to Dockets 87 and 288, concluded that the Truckee Meadows 'was entirely within Washoe aboriginal territory" (Lerch, et al., 2010:31). The ICC said that the eastern boundary of the Washoe Territory was on the mountain ridgeline on the eastern side of the Truckee Meadows. The boundaries were later supported by maps assembled by Omer Stewart (1966) that demonstrated a high degree of agreement between anthropologists and others who argued that the point where the boundary crossed the Truckee River was consistently located east of the historical Glendale (south of present-day Sparks well into the Truckee River Canyon."

Apparently the ICC disregarded much of the testimony from the Northern Paiutes which dispute most of the claims regarding exclusive Washoe use of the Truckee Meadows. Evidence supplied to the ICC in 1951 supported the claims that the Northern Paiutes lived in, and utilized the area: "on the west of the Sierra Nevada Mountains rose sharply to divide the northern Paiute from their Neighbors to the west, with the exception of a small area on the eastern slopes of the mountains which was occupied by the Washoe Indians" (Lerch et al., 2010:31-32).

The Northern Paiutes and Washoe both claim the Truckee Meadows with their respective names and places where their ancestors lived and are buried; they hunted, held ceremonies and conducted their life ways. At the time of Euroamerican intrusion the land was important to both Paiute and Washoe peoples.

The other important aspect of the ethnohistory report (Lerch et al., 2010) was the identification of Traditional Cultural Properties in or near the study area. The only two that were cited in the report are Rattlesnake Mountain, which is on Alexander Lake Road between the Bella Vista Ranch and Huffaker Hills, and the Truckee River[12]. RattlensnakeMountain is not near any potential project elements, and there are no plans for the proposed project to have any effects on the river.

5.18.2 Environmental Consequences

Basis of Significance

Any adverse effect on cultural resources that are listed on, or are eligible for listing on, the NRHP are considered to be significant. The criteria for listing in the NRHP (36 C.F.R. § 60.4) are listed below:

NRHP criteria for evaluation

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location,

[12] Initial indications from several tribal participants at the January 23, 2007 meeting at Big Bend was that the Truckee River did not hold any special importance to them.

design, setting, materials, workmanship, feeling, and association and

(a) that are associated with events that have made a significant contribution to the broad patterns of our history; or

(b) that are associated with the lives of persons significant in our past; or

(c) 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; or

(d) that have yielded, or may be likely to yield, information important in prehistory or history.

Adverse Effect

Effects to cultural resources would be from four types of construction related actions: (1) effects to the integrity of the visual and physical setting of historic properties; (2) effects to the structural integrity of historic buildings and structures from demolition; (3) effects from earth moving activities; and (4) effects from clearing, grubbing, and follow-on planting.

Effects are considered to be significant if they alter, directly or indirectly, any of the characteristics of a cultural resource that qualify that resource for the NRHP so that the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association is diminished.

No Action Alternative

Under this alternative no flood risk management features would be introduced by USACE. Adverse effects to known cultural resources are more likely to occur from abandonment, or disrepair than future flooding in the Truckee Meadows reach. There is insufficient information survey information available for the lower Truckee reaches to make a clear statement about effects resulting from the No Action Alternative.

Alternative 3-Floodplain Terrace Plan

The Floodplain Terrace Plan would reduce damaging flood events in the Truckee Meadows reach.

<u>Truckee Meadows Reach</u>

Actions in this reach mainly involve construction of a levee on Mill Street, floodplain terracing, construction of 24,000 feet of paved levee and levee maintenance road/recreation trial, realignment of the Pioneer Ditch, and reconstruction of the North Truckee Drain.

The proposed realignment of the Pioneer Ditch would substantially further alter the integrity of the original ditch, the alignment, and the setting of the ditch.

The Mill Street setback levee would require the removal of the Ferrari Family farm house which is of 1940s to 1950s era brick ranch style design. The Ferrari family has been farming in that location since 1912 (Ferrari, 2011). The floodplain terracing on the south bank of the river would require the removal of the Ferrari barn and outbuildings. The barn is substantially older than the brick farm house. The Ferrari Farm was recorded and recommended to be NRHP eligible (JRP, 2011).

The Sagewind/Bristlecone Mental Health complex of buildings would be removed. According to the JRP (2011) survey this complex would not be NRHP eligible, but if the property is found eligible for listing in the NRHP there would be an adverse effect on the setting and view shed of the complex. The buildings have since changed hands a few times and been physically modified. Assuming that the complex retained its original integrity it may qualify for the NRHP, but in its current state this is doubtful (Harmon, 2004; Harmon, 2011).

Cultural resources surveys of the north bank of the Truckee River, Steamboat Creek, and Boynton Slough were negative for cultural resources. New levees on the north side of the Truckee River would not affect cultural resources.

Approximately one mile east of McCarran Boulevard, the historic period Jones Ranch was recorded. The ranch is comprised of four buildings, two of which will be determined by USACE as eligible for the NRHP. The two story stone house was built in 1859 for use as a creamery, but was later used as residence. The barn was constructed in 1865 and is a classic western barn design. Both buildings have excellent structural integrity. The barn is still in daily use. The other two buildings are a garage and the derelict ranch house. A comprehensive history of the Jones ranch was compiled in 1989 (Emmerich, 1989). The Jones Ranch was recorded as an historic archeology site in 2006 for this project and it was assigned the trinomial number 26Wa7956. However, placement of riprap on the north bank of the Truckee River will not affect this property.

Between the UNR Farms Main Station Field Laboratory complex and the Jones Ranch are three properties, one of which is an historic site comprised of a cobble and mortar incinerator, remnants of a concrete foundation, four concrete cisterns, and miscellaneous beverage bottles dating to the 1930s. The site was recorded and given 26Wa7958 for a site number. Immediately east of it are the old Yori Garage and a brick residence building for UNR Farms employees. These two buildings were also recorded on Historic Resource Inventory Forms and evaluated for the NRHP by JRP in 2011. Neither are expected to be determined NRHP eligible, or affected by the placement of riprap. . NRHP determination will be made by USACE during PED.

There are no effects associated with the North Truckee Drain realignment. The alignment of the North Truckee Drain is along a commercial thoroughfare and was surveyed for cultural resources by USACE in 2008 and by HDR, Inc. in 2010. The alignment was negative for cultural resources. However, there may be buried deposits associated with the old O'Connor property and/or the hand car house which were in the North Truckee Drain realignment footprint.

The location of the recreation features near Mill Street and McCarran Boulevard has not yet been fully surveyed, except for the bypass channel and levee alignments. The possibility of finding buried archeology sites in this location is the same as the possibility discussed in the UNR Farms location discussed above. Approximately 300 acres remain to be surveyed.

The location of the new trail on the north side of the Truckee River has been surveyed for cultural resources and was negative. The proposed trail on the south side of the river between Greg and Steamboat Creek is in a location that would already be affected by the floodplain terracing and relocation of Clean Water Way.

Proposed terracing, levee construction, and ditch realignment in this reach would have an adverse effect on the Ferrari Ranch buildings, and the Pioneer Ditch. The Ferrari Ranch and Pioneer Ditch have been recommended NRHP eligible (JRP 2011) but not evaluated. They will be likely found to be NRHP eligible under NRHP citeria A-C. The adverse effects would be to the design, construction, setting and

individuals who were responsible for these historic features. Otherwise, no adverse effects are anticipated in this reach.

Lower Truckee River Reach

In 2010 a survey of the Lower Truckee River Reach was conducted in Washoe County (Basin Research, 2010). Rights of entry were not obtained for some of the parcels in Washoe County, all of Storey County, or the Pyramid Lake Paiute Reservation. The Basin Research survey was negative for cultural resources. Their surveys were centered on selected parcels, in the Patrick, Derby Dam, and Fernley West topographic quadrangles. Most of the Lower Truckee River reach has not been surveyed for cultural resources for this project.

The records and literature search shows small acreage surveys primarily on the Patrick and Derby Dam Quadrangles. The number of surveys drops considerably on the Fernley West Quadrangle, and there have been no surveys completed on the Wadsworth Quadrangle. The existing surveys were done for specific small projects such as cellular phone tower installations, or the Cultural Resources Reconnaissance Survey for the Reno-Sparks Effluent Pipeline-Wastewater Treatment Capacity Increase project (Burke 1990a). The entire area APE would be surveyed, or resurveyed for cultural resources by USACE prior to project implementation.

In 2005 a windshield reconnaissance of the Lower Truckee was conducted to assess the potential for cultural resources in the Truckee River Corridor (Young, 2005). The river channels have low potential for the presence of prehistoric cultural resources within or adjacent to active or abandoned channels. Historic-era resources, such as transportation, agricultural, and reclamation resources, are more likely to be found in these locations. Construction and the use of the listed resources may have contributed to defining the channels (Young, 2005).

Overall, indirect effects to cultural resources are anticipated to be less than significant in this reach for this alternative.

Alternative 2-Detention Plan

Truckee Meadows Reach

Actions in this reach would involve construction of levees on the north bank of the Truckee River from Highway 395 to Vista, and construction of a levee on the South bank of the river running from Greg Street to the point where it intersects with the UNR Farms Detention Basin levee on the east. Other features include lengthening McCarran Boulevard Bridge, relocation of Clean Water Way and the Pioneer Ditch, realignment of the North Truckee Drain, construction of levees and floodwalls between Steamboat Creek and Boynton Slough, and the use of UNR Farms and Huffaker Hills locations for detention basins.

The archeology survey of the northern side of the Truckee River was negative for cultural resources. Therefore the proposed levee would not affect any cultural resources. The proposed levee on Mill Street would adversely affect the Ferrari Farm due to its removal for the levee construction. Otherwise the area between Highway 395 and South McCarran Boulevard is negative for effects to cultural resources. The Jones Ranch buildings would require modification or removal. Effects to the Ferrari Farm and Jones Ranch buildings would be considered significant.

The UNR Farms Detention Basin was resurveyed by USACE for this project. Four new sites were recorded, and two previously identified sites, 26WA5182 and 26WA5204 were relocated. All the sites will require NRHP evaluation pursuant to 36 CFR 60.4(D). Anticipated inflow of flood water and inundation during a major flood event in the proposed detention basin would not have an adverse effect

on all six sites as they have already been subjected to serious levels of flooding in 1997 and 2005.

The USACE survey of Huffaker Hills identified four archeology sites. These would not be adversely affected for the same reasons listed above for the UNR Farms Detention Basin.

The USACE surveys of Steamboat Creek and Boynton slough were negative for cultural resources. Extension of culverts on Boynton Slough, construction of levees, construction of floodwalls on Steamboat Creek and Boynton Slough, and replacement and enlargement of the culvert at Peckham Road would not affect cultural resources. Realignment of the North Truckee Drain would be through an industrial neighborhood. There would be no affects to cultural resources.

Lower Truckee River Reach

Indirect effects to cultural resources in the Lower Truckee River reach would be similar to those discussed for the Floodplain Terrace Plan . Overall, indirect effects to cultural resources are anticipated to be less than significant in this reach for this alternative.

5.18.3 Mitigation Measures

Mitigation Features would be consistent with requirements that are stipulated in the PA (see Appendix F: Cultural Resources). Substantial portions of the APE, especially the Lower Truckee reach, have either not been surveyed due to real estate issues, or have only been partially surveyed well over ten years ago. Any archeology sites, historic buildings, structures, or objects that may be affected would require development of an evaluation plan to determine their potential NRHP eligibility. Assuming that any sites are found to be eligible, the PA requires development of a Historic Properties Treatment Plan (HPTP), in consultation with SHPO. The HPTP would guide the level of data recovery, or mitigation. The main requirements of the contents of a research design and HPTP are is in Appendices 1 and 2 of the PA. In most cases archeology sites would be excavated and historic buildings, structures or objects would minimally be recorded with Historic American Building Survey (HABS) or Historic American Engineering Record (HAER) specifications and possibly relocated to a new location if they are to be removed for a project action. Given the level of adverse effects of the project, all historic properties in the Truckee Meadows Reach would more than likely directly affected and removed during construction.

Alternative 3-Floodplain Terrace Plan

Truckee Meadows Reach

The Pioneer Ditch would require evaluation for NRHP eligibility, which would be followed by mitigation if determined eligible. Mitigation would consist primarily of HAER documentation. Additional mitigation, as specified in an HPTP, may occur in the form of a popular book with the complete history, photographs, and maps of the Pioneer Ditch.

Due to the age of the Ferrari Farm, and fact that the Ferrari Family are longstanding prominent members of the community, JRP's report recommended NRHP eligibility of the farm. If, after consultation with SHPO by USACE, the Ferrari Farm is determined to be ineligible for the NRHP, no further work is required. If the farm is found to be eligible, an HPTP would be developed which would dictate the level of mitigation. Minimally, HABS recordation would be required.

Since Young and Wriston (2007) stated "large scale excavations in the areas of the UNR Farms floodplain are likely to encounter buried archaeological resources" the project likely would implement a monitoring program and expeditious discovery treatment plan to mitigate any adverse effects to eligible historic properties discovered during ground disturbing actions in that project location. A discovery plan, pursuant to Stipulation IX of the PA (see Appendix F), should be developed prior to the commencement

of ground disturbing activities. In the event that human remains are encountered that are determined to be Native American, they will be treated according to Nevada State Law, NRS 383. The Reno-Sparks Indian Colony, the Washoe Tribe of Nevada and California, and The Pyramid Lake Paiute Tribe will be notified.

New levees, floodway, and paved trails and maintenance roads on the north side of the Truckee River would not affect cultural resources. The location of the proposed levee at the UNR Farms was negative for cultural resources during the archeology survey phase of the project. The Jones Ranch, 26Wa7956, and the Yori garage will not be affected by this alternative. Therefore, no mitigation is required.

Alternative 2-Detention Plan

Truckee Meadows Reach

Mitigation would be the same as the Floodplain Terrace Plan, with the exception of the UNR Farms and Huffaker Hills detention basins. The six sites in the UNR Detenion Basin are not anticipated to be adversely affected by the the inflow of flood water, so no mitigation is expected. However, if any of the archeology sites are determined to be NRHP eligible, an Historic Property Treatment Plan would be developed pursuant to Stipulation V of the PA.

For the Jones Ranch, a determination of eligibility would be required. The Jones Ranch is expected to be National Register eligible under criteria a, b, and c. Historic resources inventory forms would need to be filled out for the two buildings. If adverse effects cannot be avoided, measures to reduce or resolve the effects would developed in consultation with SHPO. Mitigation for the removal of the Creamery Building would consist of HABS recordation and relocation to a suitable location and some form of adaptive reuse. The precise level of documentation and reuse would be developed in consultation with the SHPO and local historic preservation advocacy groups. The barn, built in 1865, would require HABS recordation, and then would be demolished. With the proposed mitigation, adverse effects to the Jones Ranch would be reduced to less than signficant.

Since Young and Wriston (2007) stated “large scale excavations in the areas of the UNR Farms floodplain are likely to encounter buried archaeological resources” the project likely would implement a monitoring program and expeditious discovery treatment plan to mitigate any adverse effects to eligible historic properties discovered during ground disturbing actions in that project location. A discovery plan, pursuant to Stipulation IX of the PA, , should be developed prior to the commencement of ground disturbing activities. In the event that human remains are encountered that are determined to be Native American, they will be treated according to Nevada State Law, NRS 383. The Reno-Sparks Indian Colony, the Washoe Tribe of Nevada and California, and The Pyramid Lake Paiute Tribe will be notified.

5.19 INDIAN TRUST ASSETS

5.19.1 Affected Environment

Indian trust assets (ITAs) are legal interests in property held in trust by the U.S. for Indian tribes or individuals. The Secretary of the Interior, acting as the trustee, holds many assets in trust. Examples are land, minerals, hunting and fishing rights, and water rights. These trust assets may be found both on- and off-reservations. This section discusses the existing Indian trust assets in the project area.

Regulatory Setting

Background

American Indian tribes occupy a unique position in the political and governmental structure of the U.S. The Constitution recognizes them as sovereign nations; that is, distinct from states and yet also distinct from foreign nations. This doctrine of tribal sovereignty was affirmed in three Supreme Court rulings in the 1800s, which recognize the right of American Indian tribes to self-govern and run their internal affairs as "domestic, dependent nations." This keeps states from interfering with that right, while allowing Congress to override an Indian nation's authority (Ridder, 2008).

From the signing of the Constitution to the late 1800s, the U.S. primarily negotiated with Indian tribes through treaties. Just after 1871, Congress changed to enacting statutes in lieu of treaties (Washburn, 2005). Pursuant to these treaties, statutes, executive orders, and judicial decisions, the U.S. has acquired a broad trust relationship with Indian tribes. That trust relationship obligates the Federal Government to protect tribal self-government, to provide services to Indian communities, and to exercise the highest degree of fiduciary responsibility with tribal and Indian lands and resources (Interior, 2002).

Federal Agency Responsibilities

Presidential Executive Order and Memorandum

Executive Order 13175. This EO, entitled *Consultation and Coordination with Indian Tribal Governments*, November 6, 2000, was issued to establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications. When implementing such policies, agencies are required to consult with tribal officials as to the need for Federal standards and any alternatives that limit their scope or otherwise preserves the prerogatives and authority of Indian tribes (Clinton, 2000).

Presidential Memorandum. In his Presidential Memorandum, *Subject: Government-to-Government Relations with Native American Tribal Governments*, April 29, 1994, President Clinton directed executive Federal agencies to (1) operate within a government-to-government relationship with Federally recognized Indian tribes; (2) consult, to the extent practicable and permitted by law, with tribal governments; (3) assess the effect of proposed agency activities on tribal trust resources; and, (4) work directly with tribal governments on activities that affect trust property or governmental rights of the tribes (Clinton, 1994).

USACE Principles and Policies

In accordance with the President's directives, USACE developed the following Tribal Policy Principles to guide interaction between USACE and Indian tribes during planning of water resource studies and projects (USACE, 2000). These principles have been implemented throughout the development of the Truckee Meadows project.

- USACE recognizes that tribal governments are sovereign entities, with rights to set their own priorities, develop and manage tribal and trust resources, and be involved in Federal decisions or activities that have the potential to affect these rights.
- USACE works to meet trust obligations, protect trust resources, and obtain tribal views of trust and treaty responsibilities or actions related to USACE, in accordance with provisions of treaties, laws, and Executive Orders, as well as principles in the Constitution of the U.S.
- USACE ensures that tribal chairs/leaders meet with USACE commanders/leaders and recognize that, as governments, tribes have the right to be treated with appropriate respect and dignity, in

accordance with principles of self-determination.

- USACE reaches out, through designated points of contact, to involve tribes in collaborative processes designed to ensure information exchange, consideration of disparate viewpoints before and during decision-making, and uses fair and impartial dispute resolution mechanisms.
- USACE searches for ways to involve tribes in programs, projects, and other activities that build economic capacity and foster abilities to manage tribal resources while preserving cultural identities.
- USACE acts to fulfill obligations to preserve and protect natural and cultural trust resources, comply with the Native American Graves Protection and Repatriation Act, and ensure reasonable access to sacred sites in accordance with published and easily accessible guidance.

Indian Trust Land and Resources

Indian trust land refers to land held in trust by the U.S. for an Indian tribe or an individual tribal member. The U.S. holds legal title to that land while the tribe or individual tribal member holds beneficial title, meaning that they have the right to use the property and derive benefits from it. Since the U.S. owns trust land, state and local laws regarding matters such as taxation, zoning, and land use do not apply to trust lands.

Indian trust resources refer to interests in lands, minerals, natural resources, or other physical assets held in trust by the U.S. for beneficial owners, and natural resources in which Indian Tribes have Federally protected or reserved interests (water, fish, wildlife, and vegetation) (Interior, 2007). Trust resources of the tribes in the Truckee Meadows project area include water rights, and fish and wildlife. The tribes are concerned with regional water quality and quantity, water distribution, fish and wildlife, and wetlands.

Tribes with Trust Land

Three Federally recognized tribes have trust land within the regional area and project area: (1) the Pyramid Lake Paiute Tribe (PLPT) (which includes Pyramid Lake) in Nevada; (2) the Reno-Sparks Indian Colony (RSIC) in Reno and Hungry Valley in Nevada; and (3) Washoe Tribe of Nevada and California. There are no tribal or trust lands in the Verdi reach.

Pyramid Lake Paiute Tribe

The formal recognition of the trust relationship between the PLPT and the U.S. can be based on the 1859 withdrawal for Indian use of “a tract of land in the northern portion of the valley of the Truckee River, including Pyramid Lake.” After subsequent surveys, an Executive Order was issued in March 1875 that further acknowledged the reservation of the PLPT. The Reservation presently covers 475,085 acres (Interior and State of California, 2008) or 742.2 square miles. The Pyramid Lake Indian Reservation is located in the Lower Truckee River reach and extends from approximately I-80 near Wadsworth north around Pyramid Lake.

Public Law 101-618 affirmed that “all existing property rights or interests, all of the trust land within the exterior boundaries of the Pyramid Lake Indian Reservation shall be permanently held by the United States for the sole use and benefit of the Pyramid Tribe (Section 210[b][1]).” This legislation also recognized Anaho Island in Pyramid Lake as a part of the Reservation and affirmed tribal ownership of the Pyramid Lake lakebed, and the beds and banks of the lower Truckee River.

The PLPT has a government-to-government relationship with the Federal Government.

Therefore, the PLPT contracts with or receives grants directly from Federal agencies or the State of Nevada to provide services to the Tribal members and residents of the Reservation. The revenue generated by the PLPT is used to support local Tribal government activities and to supplement the programs that provide direct services to the Tribal members or residents.

Much of the economy on the Pyramid Lake Reservation is centered around fishing and recreational activities at Pyramid Lake. In addition to permit fees for fishing, day use, and overnight camping, the PLPT also receives lease revenue and tax revenue. Several Tribal members belong to the Pyramid Lake Cattleman's Cooperative Association, and the Association uses the Reservation desert open range to operate and manage the individual cattle herds (PLPT, 2004).

Reno-Sparks Indian Colony

The RSIC was created in 1916 when 20 acres were set aside in Reno for use by members of the Northern Paiute, Washoe, and Western Shoshone people. An additional 8 acres in Reno were added later, including land in the Truckee Meadows reach near Highway 395 and E. Second Street. Recently, the colony acquired 1,920 acres in Hungry Valley north of Reno. The land is used primarily for residential purposes (Interior & State, 2008).

Washoe Tribe of Nevada and California

The Washoe Tribe of Nevada and California is a Federally recognized Indian Tribe organized pursuant to the Indian Reorganization Act of June 18, 1934, as amended. The Tribal office is located in Gardnerville, Nevada. The Washoe Tribe has four communities: three in Nevada (Stewart, Carson, and Dresslerville), and one in California (Woodfords). There is also a Washoe community located within the RSIC.

The Washoe Tribe has jurisdiction over trust allotments in both Nevada and California, with additional Tribal trust parcels located in Alpine, Placer, Sierra, Douglas, Carson, and Washoe Counties. The Tribe also has cultural interests at and near Lake Tahoe, but does not exercise any water rights in the Lake Tahoe or Truckee River basins.

Tribal history extends an estimated 9,000 years in the Lake Tahoe basin and adjacent east and west slopes and valleys of the Sierra Nevada. The present day Washoe Tribe has deep roots in the past, radiating from Lake Tahoe, a spiritual and cultural center, and encompassing an area that stretches from Honey Lake to Mono Lake (Interior & State, 2008).

Tribes with Water Rights

The PLPT and RSIC have water rights recognized as trust resources.

Pyramid Lake Paiute Tribe

The Federal actions that set aside Pyramid Lake Indian Reservation explicitly reserved Pyramid Lake for the PLPT’s benefit. Water rights for the Reservation were claimed by the Department of the Interior in 1913, at the same time that Interior was claiming water for the Newlands Project. When the Orr Ditch decree was finally issued in 1944, the PLPT was given an appropriation date of 1859, senior to all other appropriators. Under the Orr Ditch decree, the PLPT was allocated an amount for irrigation not to exceed 4.71 acre-feet per acre for 3,130 acres of bottomland farm (14,742 acre-feet) (Claim No. 1) and another 5.59 acre-feet per acre for 2,745 acres of benchlands (15,345 acre-feet) (Claim No. 2). Other than irrigation, no additional water was allocated for the fish or fish habitat in Pyramid Lake or the lower Truckee River.

Over the years, the PLPT has actively worked to protect Pyramid Lake and increase inflow to the lake. With the elevation of Pyramid Lake falling and flows diminishing, the PLPT sought in 1973 to reopen the Orr Ditch decree to obtain additional water rights for the lake and its fishery. The PLPT alleged that the Federal Government had breached its trust responsibility when it defended water rights for the Newlands Project and did not diligently defend Tribal water rights for all purposes. Following lengthy litigation, the U.S. Supreme Court ruled in 1983 that the Orr Ditch decree was final and binding.

When the Department of the Interior implemented operating criteria for the Newlands Project in 1967, the PLPT intervened, claiming that the Secretary was taking his trust responsibilities too lightly. The Secretary was advised that his trust responsibilities included conserving water for the PLPT. Interim implementation of the Newlands Project's Operating Criteria and Procedures decreased diversions from the Truckee River, thus allowing additional water to flow into Pyramid Lake. Additionally, Stampede Reservoir and, to a lesser degree Prosser Creek Reservoir, have been operated to supplement unregulated Truckee River flows for the benefit of Pyramid Lake fishes (Interior & State, 2008).

Reno-Sparks Indian Colony

Members of the RSIC believe they may have rights to about 30 acre-feet of water under the Orr Ditch decree.

Tribes with Fish and Wildlife Resources

The PLPT has fish and wildlife trust resources recognized as trust resources.

Pyramid Lake Paiute Tribe

The Pyramid Lake fishery remains one of the cultural mainstays of the PLPT. To protect the fishery, the PLPT maintains two hatcheries; is working cooperatively with Federal, State, and private agencies to protect spawning areas and improve river access for spawning, as noted below; and seeks more inflow to Pyramid Lake, as noted previously. The Tribal fishery program operates hatcheries at Sutcliffe and Numana. Tribal hatcheries raise both the threatened LCT and endangered cui-ui. The LCT hatcheries support a world-class fishery and the cui-ui hatchery is a "fail-safe" operation to maintain the genetic strain in case of a catastrophic event.

The PLPT uses a portion of the interest from the principle of the $25 million Pyramid Lake Paiute Fisheries Fund, provided under Section 208 of Public Law 101-618, Title II – Truckee-Carson-Pyramid Lake Water Rights Settlement Act of 1990 (P.L. 101-618), for management of the Pyramid Lake fishery. As part of endangered and threatened species recovery efforts, the Federal Government, in consultation and coordination with the PLPT, is developing a plan for rehabilitating lower Truckee River riparian habitat to enhance fish passage and spawning. Improvements have occurred to Marble Bluff Dam facilities. Along with conserving fish, the PLPT manages and controls fishing and hunting rights on the Reservation (Interior & State, 2008).

Tribes with Trust Funds

Pyramid Lake Paiute Tribe

Indian trust funds are money, securities, and negotiable or investment instruments held by the U.S. for beneficial owners (Interior, 2007). Public Law 101-618 established the $25 million Pyramid Lake Paiute Fisheries Fund and the $40 million Pyramid Lake Paiute Economic Development Fund. The PLPT has complete discretion to invest and manage the Pyramid Lake Paiute Economic Development Fund.

5.19.2 Environmental Consequences

This section identifies and evaluates the potential effect of the proposed alternatives on the Indian trust assets in the project area. This includes land, water rights, and vegetation and wildlife resources. These assets were evaluated in consultation with the PLPT, RSIC, and Washoe Tribe of Nevada and California. The Washoe Tribe of Nevada and California has no ITAs or land in the project area.

Significance Criteria

Adverse effects on ITAs were considered significant if implementation of an alternative plan would result in any of the following:

- Any loss, damage, unlawful alienation, waste, or depletion of Indian trust assets.
- Any loss of treaty-based fishing, hunting, gathering, or similar rights of access and resource use on traditional tribal lands.

Methodology

The methodologies used to analyze hydraulic flows of the river, vegetation and wildlife habitat values, sediment transport affects on fisheries habitat, water rights issues, and cultural resources and tribal consultation for effects on ITAs are presented below.

Hydraulic Modeling

Hydraulic modeling (HEC-RAS and FLO2D) was conducted simulating river flows and floodplains for flow frequencies ranging from 1/5 chance of occurrence and 1/500 chance of occurrence. A preliminary Takings Analysis that evaluated changes in floodpool depth, duration, and frequency and assessed the potential damage to property as a result of changing conditions was conducted on all parcels within the project floodplains. Results of these analyses and information regarding the Bed, Bank, and Scour Analysis using the hydraulic models and field visits to identify and evaluate possible scour locations is provided in Sections 5.3 Hydrology and Geomorphology.

Vegetation and Wildlife

Spatial and temporal analysis was conducted, in coordination with the USFWS, on each alternative for potential affects to habitat cover types and values. Additional information regarding this analysis is provided in Section 5.5 Vegetation and Wildlife.

To address concerns regarding the potential for change in sediment transport due to an increase in river flows, and its potential affect on fisheries' habitat along with increased sediment deposition in the Pyramid Lake delta, a River Sediment Budget Analysis was conducted. Additional details of this analysis are provided in Section 5.3 Hydrology and Geomorphology.

Water Rights

As discussed in Section 5.2.6 Water Resources and Supply, the project would not affect availability of water for fulfillment of water rights obligations.

Cultural Resources

As discussed in Section 5.18 Cultural Resources, records and literature searches and archeological field surveys were conducted to identify known or potential significant cultural resources within the project area. In addition, a geoarcheaological study was conducted in the UNR Farms area to

determine the potential for buried cultural resources. Several interviews with local historians and archeaologists were also conducted.

At the suggestion of the Nevada SHPO, an ethnohistoric study was conducted to attempt to determine the ancestral homeland claims of the Washoe Tribe and Northern Paiute Tribe in the Truckee Meadows and to determine any Traditional Cultural Properties in the project area (Lerch, et. al., 2010). The study included extensive archival and oral research, and community meetings with tribal members. As part of the data gathering, the ethnographers interviewed 14 Native Americans and one non-Native American. The interviews imparted information regarding family histories, genealogical information and memories of life at the Reno-Sparks Indian Colony and in the Reno-Sparks area. Also of value were visits to archeological and ethnographic sites that were heretofore unknown outside of the native community. The study also included an interview with Reno-Sparks Indian Colony (RSIC) Tribal Elder, Thelma Delorme. In the interview, which was conducted by her son Mr. Norman Delorme, Ms. Delorme recounted how the land east of the RSIC looked during her childhood in the in the 1930s and 1940s.

Coordination and Consultation

As part of an EIS, the Federal lead agencies coordinate and consult with Native American representatives, the Bureau of Indian Affairs (BIA), and the Department of Interior Solicitor's Office, if necessary, to determine if there are ITAs in or near the project area. If trust assets are identified, the lead agencies must disclose any potential effects to the assets and develop appropriate mitigation or compensation in coordination with the Native American representatives. Some mitigation agreements might require congressional approval depending on how or if the agreement might change the Federal action. Consultation is an ongoing process and will continue throughout implementation of the project.

In 2004 the USACE project manager and project archeologist gave presentations of the project to the Washoe Tribe of Nevada and California (WTNC) Cultural Committee, and to Mr. Ben Aleck, Director of the PLPT Museum. A teleconference was held in 2007 between USACE and the RSIC. USACE was represented by former District Engineer, Colonel Ron Light; Environmental Manager, Dan Artho; and Archaeologist, Richard Perry. The RSIC was represented by Tribal Chairman Arlan Melendez; The Director of the Planning Department, Scott Nebesky; and Cultural Resources Program Manager, Michon Ibon. The purpose of the teleconference was an informal discussion between the two entities with regards to the current status of the project.

Letters were sent to the WTNC, PLPT, RSIC, Carson Colony Council, Dresslerville Community Council, Stewart Community Council, and the Woodsford Community Council. Two letters were sent to each group, one on February 3, 2005, and again on August 9, 2005. The purpose of the February 3rd letters were to introduce all groups to the project, inquire if they had knowledge of traditional cultural properties and sacred sites, or archeology sites, and invite them to participate in the Programmatic Agreement (PA) as concurring parties, and offer comments on the draft PA. The August 9 letter invited all parties to sign the negotiated PA. To date, no Native American groups have signed the PA.

USACE initiated Government-to-Government consultation with the PLPT with a formal meeting between the Sacramento District Engineer Colonel Ronald Light and Chairman Norman Harry on July 25, 2006. A draft MOU outlining proposed Government to Government proceedings between USACE and PLPT was subsequently developed by USACE and submitted on April 4, 2007 to the Tribe for their review and approval. Following election of a new Tribal Chairman in 2008 and in 2010, discussions regarding MOU continued between USACE and the Tribe, leading to a resubmittal of a revised draft MOU to the Tribe for their consideration in February 2011. While the MOU has yet to be signed, coordination has continued with the Tribe, including numerous meetings with tribal staff to brief them on project status. Correspondence with the PLPT staff includes frequent meetings between USACE project

staff and tribal technical staff and consultants, provision of project documents and data to the Tribe, including hydrology and hydraulic data and models used for the project, and presentations to the tribal council on project status.

USACE initiated Government to Government consultation with the RSIC with a formal meeting between Sacramento District Engineer Thomas Chapman and Chairman Arlan Melendez on January 30, 2008. A draft MOU outlining proposed Government to Government proceedings between USACE and RSIC was subsequently developed by USACE and submitted on July 28, 2011 to the Tribe for their consideration. While the MOU has yet to be signed, coordination has continued with the Tribe, including numerous meetings with tribal staff to brief them on project status, particularly in regards to the levee and floodwall constructed on RSIC land.

Coordination and consultation efforts with the tribes is ongoing, with additional meetings scheduled and proposed throughout the feasibility, design, and construction phases of the project.

No Action Alternative

Under the No Action Alternative, permanent effects that would occur on existing ITAs in the project area include: 1) increased flow discharge under TROA; 2) utilization of existing water rights; 3) fish recovery efforts; 4) riverbank stabilization; 5) removal of Numana Dam; and 6) inundation of tribal agricultural land. The following provides additional details of these effects:

- Under TROA, the Lower Truckee River flows and discharge to Pyramid Lake would be greater. With the increase in flow and the capacity to manage such water, TROA would:
  - Assist in improving lower river water quality;
  - Increase the elevation of Pyramid Lake;
  - Enhance the riparian canopy in and stabilize the lower river;
  - Enhance recreational opportunities at Pyramid Lake;
  - Enhance spawning opportunities for cui-ui; and
  - Enhance river habitat for Pyramid Lake fish species.
- The exercise of Lower Truckee River agriculture and M&I water rights, including those of the PLPT, would continue to be satisfied as currently established.
- Recovery efforts by USWFS would continue for the endangered cui-ui and threatened LCT.
- Purchase of additional water rights under the Water Quality Settlement is expected to be completed. This will dedicate additional flows to Pyramid Lake and minimally improving water quality in the Lower Truckee River.
- The PLPT would continue to pursue grants to stabilize riverbanks and protect farmland adjacent to the river.
- Livestock grazing is expected to be maintained at current levels on tribal land.
- With implementation of TROA, the PLPT has full discretion to invest and manage the $40 million Pyramid Lake Paiute Economic Development Fund.
- Removal of Numana Dam would be completed by the PLPT with support and funding from BIA and USBOR, improving upstream mitigation of fish, including cui-ui.
- Inundation of tribal agriculture land within the Lower Truckee River floodplain would continue;

resulting in deposition of sediment, the natural shifting of the river channel in a dynamic reach of the Lower Truckee River, and the blow out of rock diversion structures at high flow events.

Alternative 3-Floodplain Terrace Plan

Temporary construction effects to channel stability, water quality, air quality, noise, land use, agriculture, recreation, cultural resources, vegetation and wildlife, fisheries, special-status species, and aesthetic resources on tribal land are all similar to what is described in each of those respective sections presented above.

Temporary work easements, as well as the use of undeveloped and vacant areas for staging during construction of flood risk management and recreation features, would have short-term direct effects on RSIC lands. However, once construction is completed, the temporary easements and staging areas would be restored and returned to pre-project conditions and uses. Therefore, construction effects as a result of implementation of the flood risk management and recreation features would result in a less-than-significant effect on ITAs.

Permanent effects related to flood risk management features and recreation features for the Floodplain Terrace Plan are described by river reach below.

Truckee Meadows Reach

The primary flood risk management features in the Truckee Meadows reach for the Floodplain Terrace Plan are setback levees, floodwalls, and floodplain terracing, which would reduce the chance of occurrence of a damaging flood event to at least 2% in the Truckee Meadows reach.

PLPT Trust Assets. No PLPT trust assets are located in the Truckee Meadows reach.

RSIC Trust Assets. As described in Section 4.6.2, the BIA has leased 20 acres of RSIC trust lands in Reno along the Truckee River (east of Highway 395) for a 200,000 square-foot commercial retail development. As a part of the development, a 2,200 foot long floodwall/levee combination has been constructed along the south bank, from Highway 395 to the Glendale Avenue Bridge. A NEPA Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the Federal leasing action were prepared and signed by the BIA in 2006.

Floodwall/levee construction along the RSIC property in the Truckee Meadows reach would commit 7 acres of trust lands to flood protection. Commitment of this trust land to such a use requires consultation with and approval from RSIC and BIA. However, installation of this floodwall/levee would decrease the risk of sustaining flood damages on the remainder of the parcel. In this case the benefits gained from decreased flood risk outweigh the adverse effect of loss of trust assets, enabling the Tribe to pursue commercial developments and revenue from that land.

Lower Truckee River Reach

Flood risk management features in the Truckee Meadows reach could induce an increase in peak flow in the Lower Truckee River reach. These additional flows could increase inundation of agricultural lands in various locations downstream of Vista.

PLPT Trust Assets. For the Floodplain Terrace Plan , flood risk management features in the Truckee Meadows reach would increase peak flows of the 1% chance flood event by 1,520 cfs at the Vista gage. This change in peak flow from existing conditions could increase water velocities and shear stresses at critical infrastructure along the river on PLPT land to the point where the chance of channel

bed and bank scour could increase.

As discussed in Section 5.3 Hydrology and Geomorphology, the increase in flows to the Lower Truckee River reach are not expected to significantly alter the sediment transport dynamics in this reach. Given the relatively minor increase in flows at even the less-frequent events (e.g., 980 cfs increase for a 2% ACE event; 1,520 cfs increase for a 1% ACE event), the change in mobilization of bed material and bank erosion would be minimal compared to current conditions. Therefore, as discussed in Section 5.5 Vegetation and Wildlife, Section 5.6 Fisheries, and Section 5.7 Special Status Species, the minimal effects to sediment load and channel stability in the Lower Truckee River reach are expected to have a less-than-significant effect on these biological resources on PLPT trust land.

RSIC Trust Assets. No RSIC trust lands are located in the Lower Truckee River reach. Therefore, no effects to their Indian Trust assets would occur as a result of flood risk management feature construction.

Alternative 2-Detention Plan

Truckee Meadows Reach

The Detention Plan would have effects to Indian Trust Assets similar to those described for the Floodplain Terrace Plan . There are not any PLPT trust assets located in the Truckee Meadows reach. Floodwall/levee construction along the RSIC property would result in a less-than-significant effect on RSIC lands.

Lower Truckee River Reach

The Detention Plan would have effects to Indian Trust Assets similar to those described for the Floodplain Terrace Plan . No RSIC trust lands are located in the Lower Truckee River reach.

5.19.3 Mitigation Measures

Consultation with the PLPT and RSIC would continue through the detailed design and construction phases of the project, coordinating construction activities with the tribal governments. BMPs to minimize construction-related effects to the resources identified on tribal lands would be implemented. Temporary work easements would be restored to pre-construction conditions and uses.

Alternative 3-Floodplain Terrace Plan

PLPT

Any encroachments onto Trust lands or resources would be compensated as prescribed under Federal law. Therefore, no mitigation is required or recommended. For any induced flooding that results in a taking of property, a non-standard estate would be negotiated with the Tribe for establishment of a flowage easement on that land. For existing structures in the floodplain that might experience flood damages above current conditions, the structure could be relocated or removed and the owner compensated fair market value. However, there are currently no structures identified on Tribal land that would be considered for a taking.

Following project authorization, findings from more detailed hydraulic models would be used to refine the project designs and minimize the effects of increased flows onto PLPT land. Detailed designs and detailed model outputs would be coordinated with the PLPT during development of the construction-level designs.

Following handover of the constructed project to the non-Federal partner for operation and

maintenance, the non-Federal partner would continue monitoring performance of project features throughout the life of the project.

Treatment protocols for historic, cultural, and pre-historic resources would be developed and agreed to with the Tribe prior to construction. If any previously unidentified resources are discovered during construction, work at the discovery location would stop immediately, the PLPT and SHPO would be contacted and the treatment protocols would be followed. Work in that location would not start again until authorization is received from the Tribe and USACE.

RSIC

For the Floodplain Terrace Plan , significant or long-term impacts to RSIC Indian Trust assets status or conditions in the Truckee Meadows reach are anticipated in association with the construction of a floodwall/levee from Highway 395 to Glendale Avenue Bridge. Any encroachments onto Trust lands or resources would be compensated as prescribed under Federal law, and USACE Principles and Policies, as described in Section 5.19.1. Any mitigation requirements listed in the EA/FONSI prepared by the BIA for the Federal leasing action on RSIC trust land in the Truckee Meadows reach for a commercial development have been implemented under that action. Therefore, no mitigation is required or recommended for this project action.

CHAPTER 6. CUMULATIVE EFFECTS ANALYSIS

This chapter briefly describes the major categories of actions, both Federal and non-Federal, in the project area that have a connection with the Truckee Meadows Flood Control Project and their potential cumulative effects on affected resources. A connection with the flood control project is defined as an action with one or more of the following attributes:

- Is located in the flood project project area.
- Affects Truckee River flows.
- Affects Truckee River floodplains.
- Has environmental links to Truckee River geomorphic and ecological functions.

6.1 REGULATORY BASIS

The NEPA regulations require that an EIS discuss project effects that, when combined with the effects of other projects, result in significant cumulative effects. The NEPA regulations define a cumulative effect 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 pyuhjerson undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taken over a period of time" (40 CFR § 1508.7).

6.2 METHODOLOGY

6.2.1 Assumptions

The geographic boundary for this cumulative effects assessment is generally the Truckee River Basin. Geographic deviations, when appropriate, are explained in the relevant resource analysis. Construction of the flood project is anticipated to begin in 2015 and could continue through late 2019. The effective life of the flood project would extend to 2068. The temporal boundaries of the cumulative effects analysis vary by resource but are generally considered in terms of temporary and permanent effects.

6.2.2 Evaluation

Cumulative effects are evaluated by first identifying other past, present, or reasonably foreseeable future actions that could have direct or indirect environmental effects in the cumulative project area. The following criteria were used to determine which actions merited further analysis relative to cumulative effects:

Reasonably Foreseeable (Actions Likely to Occur)

The CEQ regulations describes cumulative effects analysis in terms of "actions," rather than "proposals." A guidance document issued by the Council on Environmental Quality titled "Considering Cumulative Effects" states, "Commonly, analysts only include those plans for actions which are funded or for which other NEPA analyses are being prepared" (Council on Environmental Quality (CEQ), 1997). This guideline was expanded to include actions for which positive responses to the following questions

could be made:

- Has the action already occurred?
- Is the action likely to occur?
- Does the action have an identified sponsor proposing it?
- Does the action have identified sources of funding?
- Has the action initiated NEPA compliance or other regulatory procedures?
- Is the action defined in enough detail to allow meaningful analysis?

Relevance (Actions that Relate to the Project)

"Considering Cumulative Effects" also states, "In general, actions can be excluded from analysis of cumulative effects if the action will not affect resources that are the subject for the cumulative effects analysis." Actions for which positive responses to the following questions could be made were included in the analysis:

- Does the action have aspects that are not already analyzed under the No Action Alternative?
- Is the action defined in enough detail to determine if there would be any potential effect on indicators used in the analysis of the alternatives?
- Does the action affect any of the indicators used in the analysis of the alternatives?

Magnitude

Minor actions were not considered further; a minor action related to several similar actions was considered in the aggregate.

The effects of these actions are then compared with the degree and timing of the potential adverse and beneficial effects of the proposed alternatives to determine the types and significance of potential cumulative effects. The cumulative effects on environmental resources are classified by:

- Neutral, beneficial, or adverse, which compares the final condition of a given resource to its existing condition.
- Minor, moderate, or substantial, which considers the relative contribution of the current project to a given effect, as well as the importance of the resource in the project area to the regional resource.
- Temporary or permanent, with permanent being assumed unless otherwise noted.

For this analysis, implementation of the flood project is considered cumulatively significant if, in concert with other described past, present, or reasonably foreseeable future actions, it would exacerbate the declining status of an identified resource (a resource that is already adversely affected) or create a condition in which an effect is initially minor but is part of an irreversible declining trend.

6.3 RELATED PROJECTS

In general, projects with potential to contribute to cumulative effects fall into the following five categories:

- **Flood risk management:** Government entities are implementing flood risk management measures in portions of the project area.
- **Water resources management:** Communities have developed and are developing water resources plans that address water rights transfers and groundwater use.
- **Urban development and land use:** Increasing populations increase demand for M&I water and, as urban areas expand, agricultural lands are developed into residential and commercial properties.
- **Ecosystem restoration:** Site-specific restoration projects are being implemented, and additional projects are likely to be implemented in the future.
- **Water quality:** Water quality standards have been developed and entities are taking actions to meet those standards.

Past, present and reasonably foreseeable future projects in the vicinity of the proposed alternatives are identified and briefly described in Table 6-1 within the categories described above. The exact construction timing and sequencing of many of these projects are not yet determined or may depend on uncertain funding sources. Projects with potential for concurrent construction and/or operational periods with the alternatives are also considered in this analysis.

6.4 ANALYSIS OF POTENTIAL EFFECTS

Some of the direct and indirect effects identified in Chapter 5.0 may result in incremental effects on the environment when considered in light of other past, present, and reasonably foreseeable future actions within specified geographical boundaries. The following analysis of potential cumulative effects corresponds with the findings presented in Chapter 5.0. Only those environmental resources with the potential to be temporarily or permanently affected by a particular component of the proposed development alternatives are discussed below.

6.4.1 Hydrology and Geomorphology

As discussed in Section 5.3, the proposed alternatives would result in temporary and permanent effects to hydrology and geomorphology that could have an incremental effect when added to other past, present, and reasonably foreseeable future actions within the Truckee River Basin.

Hydrology

Hydrologic changes in the study area would be considered significant if they substantially alter the existing drainage pattern of the site or area or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site; significantly raise flood stage elevations; or, substantially increase the frequency and duration of inundation of lands.

In addition to the flood project alternatives evaluated in this EIS, other projects with the potential to contribute changes to the existing drainage pattern, flood stage elevations, or the frequency and duration of inundation of lands in the Truckee Meadows reach would be the Southeast Connector Project and various Southeast Truckee Meadows development projects, as well as possible changes to operation of Martis Creek Dam as a result of the Dam Safety Modification Study. Given the hydraulic separation between the Downtown Reno reach and the Truckee Meadows reach, potential changes from future Downtown Reno development projects are not expected to contribute to cumulative hydrologic effects in the Truckee Meadows reach.

Table 6-1. Existing and Planned Projects in the Vicinity of the Project Area

Project Name	Proponents	Project Description	Project Status/ Schedule
Flood Risk Management			
Truckee River and Tributaries, California and Nevada Flood Control Project	USACE, State of California, State of Nevada, Pyramid Lake Paiute Tribe (PLPT)	Enlarged the Truckee River channel at the control structure at Lake Tahoe and for approximately 7.5 miles in the Truckee Meadows downstream from the Second Street bridge. Also included intermittent channel improvements between Vista and Nixon, Nevada. Spawning gravel and a fish pool were added just below the Lake Tahoe control structure. Current actions consist of maintenance of the channel bottom widths and intermittent channel clearing downstream to Nixon. Parties responsible for O&M are: State of California (Lake Tahoe to California-Nevada state line); State of Nevada (Reno to Wadsworth); PLPT (Pyramid Lake Paiute Reservation).	Completed 1964
Martis Creek Flood Control Project	USACE, Carson-Truckee Water Conservancy District, City of Reno	Construction of a dam to form 15,000 acre-foot capacity reservoir on Martis Creek near Truckee, California. Project also included channel clearing from the state line to city of Reno and construction of an earth dike along the river from Booth Street to Bell Street, a rock and concrete block wall from Bell Street to Arlington Avenue, and parapet wall closure from Arlington Avenue to Center Street. Maintenance called for maintaining channel capacity in Reno at 14,000 cfs.	Completed 1974
Martis Creek Dam Dam Safety Assessment Study	USACE	Existing seepage, spillway, and seismic issues on the Martis Creek Dam have led to a dam safety assessment study to identify most appropriate action to reduce life-loss risk.	Study ongoing
Washoe County, City of Reno, City of Sparks flood control projects on tributaries	Washoe County, Reno, Sparks	Various detention basin and levee/floodwall projects constructed by local municipalities along tributaries for increased flood risk management.	Ongoing
Truckee River Flood Warning System and Flood Response Plan	USACE, Washoe County	The system established 40 river stage and precipitation gauges in the Truckee River watershed that are fully integrated with the National Weather Service River Forecast Center, and city and county emergency operations centers.	Completed 2004
Stampede Reservoir Dam Safety Modification	USBOR	In order to safely pass the probable maximum flood (PMF), USBOR is evaluating various alternatives, including raising the dam crest approximately 11 feet. Reservoir operations are not expected to change from normal, existing conditions except during times of extreme flooding (above the 500-year event), and that normal, existing reservoir operations will resume within days after flooding has resided.	2013
Seasonal Flood Storage in Upstream Reservoirs	USBOR, USACE	Flood storage is made available seasonally in upstream reservoirs at Lake Tahoe, Prosser, Stampede, Boca, and Donner Lakes.	Ongoing

Project Name	Proponents	Project Description	Project Status/ Schedule
Water Resources Management			
Newlands Project	USBOR, Truckee-Carson Irrigation District (TCID)	Provides full service irrigation water from the Truckee and Carson Rivers for about 55,000 acres of cropland in the Lahontan Valley near Fallon and bench lands near Fernley in western Nevada. In addition, water from about 6,000 acres of project land has been transferred to the Lahontan Valley wetlands near Fallon. Lake Tahoe Dam, a small dam at the outlet of Lake Tahoe, the source of the Truckee River, controls releases into the river. Downstream, the Derby diversion dam diverts the water into the Truckee Canal and the Truckee Canal carries it to the Carson River. Other features include Lahontan Dam and Reservoir, Carson River diversion dam, and Lahontan Power plant.	Constructed in 1903
Truckee River Operating Agreement (TROA)	States of Nevada and California, Department of Interior, TMWA, and the PLPT	Would increase the operational flexibility and efficiency of reservoirs in the Lake Tahoe and Truckee River basins. TROA changes the operation of Federal reservoirs and Sierra Pacific's (now NV Energy) exercise of its Truckee River water rights to (1) improve spawning conditions for the Pyramid Lake fishes and (2) provide additional municipal and industrial water for the Truckee Meadows during drought situations. Approval of the Orr Ditch Court in the U S District Court in Reno and Truckee General Electric Court in the US District Court in Sacramento and the approval of water rights change petitions by the California State Water Resources Control Board (SWRCB) must be completed before TROA can be implemented.	TROA was signed in 2008; modification to the Orr Ditch Decree, General Electric Decree, and others are ongoing.
Orr Ditch Decree	USBOR, TCID, Sierra Pacific (now NV Energy), WCWCD, Federal Water Master	The decree adjudicated water rights of the Truckee River in Nevada and established amounts, places, and types of use, and relative priorities of the various rights. It incorporated the 1935 Truckee River Agreement and authorized the construction of Boca Reservoir.	1944
Tahoe-Prosser Exchange Agreement	USBOR, Federal Water Master	Agreement allows streamflow maintenance releases to be made from Lake Tahoe when releases are unnecessary to meet Floriston Rates. Minimum releases of 70 cfs from April through September and 50 cfs the remainder of the year are made when an equivalent amount of water in excess of Prosser Creek minimum releases of 5 cfs is available for storage. If inflow to Prosser Creek is less than these releases and there is no storage available, releases from Lake Tahoe are reduced to that of Prosser Creek inflow.	
Newlands Project Operations Criteria and Procedures (OCAP)	USBOR, TCID, Federal Water Master	OCAP establishes procedures to define the annual water demand of the Newlands Project and regulates the diversion of water from the Truckee River to meet that demand.	1997

Project Name	Proponents	Project Description	Project Status/ Schedule
Urban Development and Land Use			
Downtown Reno Redevelopment Projects	Reno Redevelopment Agency	Projects include the Truckee River Walk, Century Riverside 12 Theatre, Palladio, Reno City Hall, Truckee River Whitewater Park at Wingfield, National Automobile Museum, and a AAA Baseball Park off of Lake Street along the Truckee River.	Ongoing
East Truckee River Canyon Area	Sparks	10,000 acres between Vista and Tracy in Washoe County, for residential, tourist commercial, open space, industrial, and business park uses.	Ongoing
Southeast Truckee Meadows Development Projects	Reno, Washoe County	Build-out of various subdivisions along Steamboat Creek corridor.	Ongoing
Tahoe-Reno Industrial Center build-out	L. Lance Gilman Commercial Real Estate, Storey County	Approximately 6,000 acres of mixed-use, nonresidential development, consisting of a wide range of industrial, office, and commercial businesses. Current businesses include Kal Kans, Inc.; Duraflex; Barrick Gold; ALCOA Sierra Micromill; Hardie Building Products; Royal Sierra Extrusions; Eagle-Picher diatomaceous earth mining; and Naniwa Power Plant.	Ongoing
Tracy I-80 Interchange	Tahoe-Reno Industrial Center	I-80, at USA Parkway Interchange. Construct new interchange with two new bridges over Truckee River, four ramps, and a connector road	Constructed in 2008
Southeast Connector roadway	RTC	Proposed eight-lane north-south roadway along the Steamboat Creek corridor that would connect Sparks Boulevard with Mira Loma Drive and possibly extending to Highway 341.	2013 - 2016
Rock Street Whitewater Park	Sparks	A whitewater park similar to the whitewater park in Reno between Greg Street bridge and Rock Boulevard bridge.	Constructed in 2008
Pyramid Lake Paiute Tribe Economic Development Enterprises	PLPT	Two potential projects include a truckstop/casino at the southern tip of the Pyramid Lake Paiute Reservation where it intersects with I-80 and a destination resort catering to recreational activities near Sutcliff along Pyramid Lake.	Unknown
Aggregate mining operations	State of Nevada	Various aggregate mining operations along the Truckee River corridor.	Ongoing
Ecosystem Restoration			
TNC Lower Truckee River Ecosystem Restoration Projects	TNC	Geomorphic restoration along approximately 9 miles of river and revegetation of approximately 400 acres of native habitat.	2006 to present
Derby Dam Fishway	USBOR	Approximately 900-feet-long fishway was constructed in 2002 to provide upstream passage of fish around Derby diversion dam. Operation of fishway is awaiting completion of a fish screen on the Truckee Canal.	Ongoing

Project Name	Proponents	Project Description	Project Status/ Schedule
Derby Dam low-flow channel	Reno; Sparks; USBOR	Channel modifications are proposed immediately downstream of Derby Dam fishway to improve water temperature and water quality for aquatic species.	Constructed 2010
Steamboat Creek Watershed Restoration Projects	Washoe-Storey Conservation District	Proposed ecosystem restoration projects along Steamboat Creek including Hidden Meadows at University Farms, Steamboat Creek Confluence, and Pleasant Valley bank stabilization.	Ongoing
Numana Dam Fish Passage Improvement Project	USBOR, BIA, Pyramid Lake Paiute Tribe	Improve fish passage through removal of BIA Numana irrigation diversion dam on Pyramid Lake Paiute Reservation.	Suspended
Marble Bluff CAP 206 Ecosystem Restoration Project	USACE, Pyramid Lake Paiute Tribe	Improve fish passage around Marble Bluff Dam through reengineering of fish ladders on existing fishway. Will be included in the Truckee Meadows Flood Control Project upon authorization of the flood project.	On Hold
Glendale Diversion Reengineering Project	TMWA	Reengineering of Glendale diversion structure to improve aquatic habitat, fish passage, and recreational boater safety.	2011
Pioneer Diversion Reengineering Project	Sparks	Reengineering of Pioneer Ditch diversion structure to improve aquatic habitat, fish passage, and recreational boater safety.	2010
Water Quality			
Water Reclamation Facilities	Reno, Sparks, Washoe County	Cities of Reno and Sparks and Washoe County own, operate, and manage five existing municipal wastewater collection, treatment, and disposal facilities. Possible expansions at several of the facilities are anticipated to meet Washoe County Section 208 Water Quality Plan projections and criteria. A wastewater treatment plant is also located in Wadsworth on the Pyramid Lake Paiute Tribe Reservation.	Ongoing
Water Reclamation Facilities	Storey County	There are three wastewater treatment plants along the Truckee River corridor within Storey County: Rainbow Bend, Kal-Kan, and Tahoe-Reno Industrial Center.	Ongoing
Industrial Treatment Facilities	Sparks	The Sparks Marina discharge is treated at a denitrification plant. The Vista Canyon Group, LLC, controls a petroleum plume contaminating groundwater near the Sparks Marina, Sparks tank farm, and various intermediate locations north and south of I-80. Treated groundwater is discharged for irrigation or to the Peoples Ditch and into the Truckee River.	Ongoing

Construction of the Southeast Connector, a six-lane above-grade roadway from the southern end of Sparks Boulevard, through the South Truckee Meadows floodway along Steamboat Creek, to the northern end of Veterans Parkway, would significantly alter existing drainage patterns and flood stage elevations in the South Truckee Meadows area without appropriate hydraulic and flood volume mitigation in place. In order to meet the regional ordinance of no effect to existing floodway storage capacity and no effect to flow patterns in the floodway, RTC designs for the roadway include a clear span bridge of the Truckee River, several culvert groupings along the alignment, bridges over Yori Drain and Boynton Slough, and several volumetric mitigation basins within the flood storage area.

Following further coordination with RTC, it became apparent that none of the flood project alternatives discussed in this EIS were included in the hydraulic modeling developed for RTC to design for the "no rise" requirement of the regional ordinance and the flood project models did not include the current design of the roadway project. Preliminary indications are that, in addition to the approximately 7 inches of increase to existing 1% ACE floodplain water surface elevations as a result of the recommended flood control plan, inclusion of the roadway in the South Truckee Meadows area could increase the 1% ACE floodplain water surface elevation by an additional 12 inches, plus or minus 6 inches. The additional flooding would likely occur to the west of the roadway. Coordination with RTC is ongoing to determine ways to avoid or minimize the cumulative increase in floodplain depths. Without further changes to either project, the increases in flood stage with both projects in place would exceed the first floor elevations of approximately 153 structures in addition to the approximately 899 structures discussed for Alternative 3 in section 5.3 Hydrology and Geomorphology.

Any increase in the base flood elevation that affects existing structures would compel the responsible NFIP communities (Washoe County and City of Reno) to implement a plan to comply with NFIP requirements. As discussed in section 5.3, the USACE estimate of a least-cost NFIP compliance option would consist of non-structural methods including house raising. Because compliance with the NFIP is a non-Federal responsibility, the affected NFIP communities could develop their own plan for compliance with the NFIP and are not required to implement the least-cost options identified by USACE. With the infrequency of the induced flooding and with NFIP compliance measures in place, these changes in drainage patterns and flooding off site would not be considered substantial and would, therefore, be a less than significant cumulative effect.

While Alternative 2 would contain increases in flood stage within detention basins on the Steamboat Creek corridor, the Southeast Connector alignment would conflict directly with the detention basin features proposed. In order to accommodate both the roadway and this alternative, substantial design changes would be necessary on both projects. Without further consideration of design changes, it is not certain that Alternative 2 would provide the same amount of flood risk reduction benefits as evaluated in the GRR. Determination of contributions to cumulative hydrologic effects from both of these projects would be speculative without further information on what design changes could be implemented to accommodate both projects.

Build out of various Southeast Truckee Meadows development projects could affect existing drainage patterns along Steamboat Creek that would also be affected by Alternative 2 of this EIS. However, it is expected that future developments would comply with local ordinances to maintain existing flood conveyance capacity within the Steamboat Creek watershed; therefore, cumulative effects to drainage patterns and flood stage elevations in the Truckee Meadows would be considered less than significant for Alternative 2. Potential Southeast Truckee Meadows developments would be located outside of the 1% ACE floodplain of the Recommended Plan (Alternative 3), and any indirect contributions to increases in flood stage elevations with this alternative are expected to be less than significant within the Truckee Meadows reach.

Martis Creek Dam is currently being operated under interim risk reduction parameters while a detailed analysis of the dam's risk of failure is carried out. Until the analysis is completed, it is not known what future action would be proposed. Because of this uncertainty, the GRR and EIS assumed that the interim risk reduction measures would remain in place under future conditions. Until a decision is made on Martis Creek Dam, incremental effects on flood stage elevations from the dam safety assessment study are not known.

As discussed in section 5.3, both flood project alternatives indirectly contribute to a less than significant incremental increase in flood stage flows to the Lower Truckee River reach compared to existing conditions. That analysis used hydraulic models that included the restored channel geometries constructed for TNC's ecosystem restoration segments. The Southeast Connector would actually help reduce the amount of induced flows downstream at the less frequent events, acting as a partial barrier to sheetflow into Steamboat Creek. The remaining potential projects within the Lower Truckee River reach (East Truckee River Canyon Area development and the Tahoe-Reno Industrial Center build-out), are not expected to substantially alter existing drainage patterns or modify the river's geometry as to cause a substantial increase in flood stage elevations. Therefore, cumulative hydrologic effects to the Lower Truckee River reach would be considered less than significant.

Geomorphology

Construction of either proposed alternative would temporarily increase erosion potential along channel banks and upland areas. If occurring simultaneously with ground-disturbing activities associated with one or more of the present or reasonably foreseeable future projects described in Table 6-1, this incremental increase in the basin's total erosion potential could adversely affect the environment. The Recommended Plan would minimize the potential for an incremental contribution to adverse cumulative effects from increased erosion through the use of Best Management Practices (BMPs) and the implementation of a Stormwater Pollution Prevention Plan (SWPPP). Similar protective measures would be required of related present and reasonably foreseeable future projects in the Truckee River Basin to comply with the Federal Clean Water Act, thus avoiding temporary cumulative effects. Short-term, construction related cumulative effects on erosion potential would therefore be considered less than significant.

As discussed in section 5.3 Hydrology and Geomorphology, the current geomorphology of the Truckee River has been greatly influenced by human-induced alterations made to the river and its flows since the early 1900s. These activities have affected the channel stability and sediment transport dynamics, particularly within the Lower Truckee River reach. These alterations to the river included straightening and widening for flood control and construction of I-80, the Southern Pacific Railroad, and the Truckee Canal. Straightening the channel had the effect of increasing the sediment transport rate because all of the streamflow was held within the banks. This caused the channel slope and flow depth to increase, and result in higher stress on the channel bank and bed material. The result was a deeper channel cut and more bank erosion. When I-80, the Southern Pacific Railroad (now Union Pacific Railroad), and the Truckee Canal were constructed in the canyon between Vista and Wadsworth, the Truckee River was constricted and realigned. Large meanders were cut off at river mile (RM) 30 and RM 35, requiring bank protection measures in these areas to compensate for the increased hydraulic energy through the cutoffs. Additional bank protection, including rock revetment, rock groins, and gabion groins, have been placed by local interests and commercial facilities (WET, 1991).

The management and distribution of water within the Truckee River Basin has also contributed to the alteration of the Truckee River geomorphology. Water storage and distribution structures influence erosion and deposition rates, river discharge, and subsequently, channel morphology. Major Truckee River Basin water-storage projects include the outlet works at Lake Tahoe; Donner Lake; Independence

Lake; and Boca, Prosser Creek, Stampede, and Martis Creek reservoirs.

Finally, diversion of water from the river for irrigation and municipal and industrial (M&I) uses also have had a dramatic effect on the geomorphology of the river. In particular, the diversion of water down the Truckee Canal at the Derby Dam to the Newlands Project caused the lowering of Pyramid Lake by elevations of up to 80 feet between 1905 and 1963. This base level lowering generated channel incision from Pyramid Lake upstream to Numana Dam.

Although it is widely agreed that detrimental effects to the river channel have occurred, studies have suggested that the majority of the Truckee River between Verdi and Pyramid Lake has been stable for the past several decades (Miller et al., 1994). It has been proposed that the Truckee River is morphologically close to a threshold between a braided and meandering channel (Harvey et al., 1981).

Implementation of the flood risk management features under either proposed alternative could increase scour potential and sediment aggradation/degradation through an increase in peak discharge, channel velocity, and channel shear stress. In conjunction with flow changes resulting from one or more of the related past, present, or reasonably foreseeable future projects located throughout the Truckee River Basin, such increases have the potential for an incremental contribution to adverse cumulative effects.

In some cases, the effects of management measures under the proposed alternatives will be more localized. Both alternatives include the use of hydraulic and sediment transport analyses to design appropriate scour protection of existing and proposed facilities, such as bridges, floodwalls, and grade control structures. These analyses would consider localized effects under existing conditions as well as the potential for system-wide flow adjustments resulting from related foreseeable future projects. Overall, while the effects of past projects have significantly altered the geomorphological condition, the effects that the two alternatives evaluated in this EIS would not significantly contribute to the further alteration of the geomorphological condition and would not preclude future actions to improve the geomorphological condition of the river.

6.4.2 Water Quality

As indicated in Section 5.4 Water Quality, as the Truckee River flows from Lake Tahoe to Pyramid Lake, pollutants, including nutrients, turbidity, and TDS, resulting from natural erosion of the watershed and from the effects of humans, enter the river and degrade water quality. Additionally, water is diverted for agricultural and municipal and industrial uses and is returned to the river in diminished quantity and quality. Available data do not reveal any major sources of contamination other than erosion of the watershed, agricultural runoff, and wastewater treatment plant discharges (Interior and State of California, 2008).

TMDLs were established for the Truckee River in 1994 to control total nitrogen, total phosphorus, and TDS from East McCarran Boulevard to Wadsworth. The total nitrogen and total phosphorus TMDLs were developed due to the presence of low DO concentrations in the lower river. The TDS, or salinity, TMDL was established to be protective of Pyramid Lake and lower Truckee River loadings. These TMDLs have been incorporated into the NPDES permit for the TMWRF. The implementation of the TMDLs changed the focus of water quality regulation of TDS and other pollutants. Originally the focus was directed toward the concentration of salts and other pollutants in the Truckee River as the seasonal flow volume changed during the year. The TMDLs have since been refocused on the actual amount of salts and other pollutants that are deposited in Pyramid Lake.

Water quality conditions in the Truckee River are dependent upon the timing and quantity of watershed runoff, regulation of reservoir releases, inputs of municipal and industrial (M&I) waste within

the urbanized areas of Reno and Sparks, reduction in flows as a result of municipal and agricultural diversions, and irrigation return flows in the lower river reaches.

Typically, wet hydrologic conditions provide the best water quality, and dry hydrologic conditions provide the worst. Currently, warm temperatures for fish and water quality problems exist minimally in wet, and mostly in median and dry hydrologic conditions. The most severe conditions occur in dry hydrologic conditions. Operations of the Newlands, Truckee River Storage, and Washoe projects pre-TROA did not adequately accommodate water quality (Interior and State of California, 2008). Water quality tends to be worse during the warm summer and early fall months. On the basis of summaries of modeled output for the TROA EIS/EIR, under current conditions in dry years, annual summaries indicated that standards for TDS and chloride concentrations to Pyramid Lake, a terminal saline desert lake, are exceeded most of the year. Total nitrogen standards in the reach from Lockwood to Derby Diversion Dam are exceeded about one-third of the year. Under TROA in dry years, annual summaries indicated that TDS and chloride concentration standards would be exceeded less often than under current conditions. Total nitrogen standards in the reach from Lockwood to Derby Diversion Dam would be exceeded less than one-sixth of the year (Interior and State of California, 2008). Overall, TROA would contribute a beneficial effect on the existing water quality conditions, reducing the number of standards exceedences; however, impaired status for TDS and water temperature would be expected to remain on the river reaches between Reno and Wadsworth.

Construction of the Southeast Connector would require soil disturbing activities and realigning segments of Steamboat Creek, a waterbody State-listed as impaired. Historic mining and milling activities, as well as natural sources, contribute to high levels of zinc, mercury, boron, arsenic, chloride, and TDS in the Steamboat Creek channel and sediments. Channel disturbance could temporarily increase the suspension levels of these constituents in the water column, risking potential increases of these constituents downstream until disturbed areas have stabilized. In addition to BMPs, the RTC will be implementing avoidance and minimization measures based on extensive soil and sediment sampling, as well as detailed water quality modeling, that would reduce the short- and long-term water effects to water quality to less than significant. Avoidance and minimization measures include relocation of the roadway alignment to avoid contaminated soil hot spots, capping unavoidable hot spots and building the roadway on top of those locations, and soil stabilization methods during and after construction activities.

As discussed in Section 5.4, the proposed alternatives would result in temporary and permanent effects to water quality that could have an incremental effect when added to other past, present, and reasonably foreseeable future actions within the Truckee River Basin.

Construction of in-channel features of either proposed alternative has the potential to increase turbidity and presents an opportunity for the accidental release of hazardous materials. Dewatering activities may encounter PCE or solvents in the groundwater. If occurring simultaneously with ground-disturbing activities associated with one of more of the present or reasonably foreseeable future projects described in Table 6-1, these alternative-specific effects could contribute to an adverse cumulative effect. The potential for an incremental contribution to adverse cumulative effects would be minimized through the use of BMPs, a SWPPP, and a Hazardous Materials Management Plan. Similar protective measures would be required of related present and reasonably foreseeable future projects in the Truckee River Basin to comply with the Federal Clean Water Act, thus minimizing temporary cumulative effects.

Restored native riparian vegetation and the improved connection of the river to the floodplain would have long-term beneficial effects to water quality due to the increase in shading of the river, lower water temperatures, and the increase in capacity of natural filtration. This increase would minimize the action alternatives' contribution to the cumulative effect on water quality. Overall, while past projects have had a significant adverse effect on water quality conditions of the Truckee River, both alternatives

would be expected to have a less than significant long-term contributory affect to the impaired water quality conditions of the Truckee River.

6.4.3 Vegetation and Wildlife

Dams to control floods and regulate the distribution of water on the Truckee River have forever altered the historic natural process that evolved riparian systems in the presence of dynamic annual water cycles, while groundwater pumping has also affected surface flows in some areas.

Riparian areas have also been affected by concentrated grazing, cutting for timber and firewood, residential development, river channelization, diversion, industrialization, log drives, wildfire suppression, trapping (principally beaver), exotic species (both plants and animals), unregulated recreation (both motorized and nonmotorized), road building, mining, pollution, farming, channel dredging, bank armoring, and construction of dams and levees. These sources of stress continue to exert pressure on riparian habitats, resulting in loss or modification of habitat integrity on the Truckee River and greatly influencing its current degraded condition.

Reasonably foreseeable future projects that could have an effect on riparian habitat within and downstream of the project area include the Southeast Connector, continued development in the Southeast Truckee Meadows, and buildout of the Reno-Tahoe Industrial Center.

Phase 1 of the Southeast Connector project would cross over the Truckee River with a 1,400-foot clearspan bridge supported by 8 bridge piers south of the river and 1 pier north of the river. All ground disturbing activities for this phase would be above the ordinary high water mark with little to no existing riparian habitat occurring in the areas of disturbance. The remainder of Phase 1 construction would take place on upland areas primarily used for agriculture on UNR Farms property. Phase 1 does not require a Department of the Army permit from USACE under Section 404 of the Clean Water Act, as amended, and construction for Phase 1 is currently underway. Phase 2 of the roadway project would extend south from Cleanwater Way to Veterans Parkway. Near the Yori Drain (spanned by a bridge), it appears the roadway would permanently disturb several acres of upland sagebrush habitat before establishing an at-grade intersection with Pembroke Drive. South of Pembroke Drive, the roadway would span Boynton Slough with a bridge and continue its alignment through Rosewood Lakes Golf Course. According to RTC consultants, from Boynton Slough south, the realignment would permanently disturb approximately 10 acres of wetland habitat and require realignment of 2 segments of Steamboat Creek between Mira Loma Drive and South Meadows Parkway. RTC is proposing mitigation of impacts to wetland habitat at a 3 to 1 ratio for high quality habitat, and 1.5 to 1 for impacts to low quality farmed wetland habitat. RTC submitted an application for a Clean Water Act Section 404 permit on July 19, 2013 for Phase 2 of the Southeasts Connector project. Construction for Phase 2 is tentatively scheduled for 2014 to 2016.

Future buildout of potential Southeast Truckee Meadows development projects could impact additional wetland habitat associated with Steamboat Creek and its floodplain. This most likely development to occur in the foreseeable future would be the Butler Ranch Public Unit Development (PUD). The Butler Ranch PUD would be located south of Mira Loma Drive and extend south to Bella Vista Ranch Road. Development in this area would likely disturb existing wetland and riparian habitat as well as require realignment of Steamboat Creek, requiring the issuance of a Clean Water Act Section 404 permit from USACE Regulatory Division. Permanent loss of wetlands or other jurisdictional waters of the U.S. would require compensation for the loss of wetland habitat and function, most likely through establishment of wetland mitigation sites.

As discussed in Section 5.5, the proposed alternatives would result in temporary and permanent effects to vegetation and wildlife that could have an incremental effect when added to other past, present,

and reasonably foreseeable future actions within the Truckee River Basin.

Staging and temporary work easements for construction of either proposed alternatives could result in the temporary disturbance of vegetation. Habitat disturbance would affect associated wildlife. Since these temporary vegetative disturbances would be minor and all areas would be restored to pre-project conditions, the activities would not contribute to adverse cumulative effects.

Implementation of either proposed alternative would include flood management features that would affect varied habitat types, including Willow/Mixed willow, Native Riparian Forest, Grassland/Native Shrub, and Emergent Wetland. Implementation of environmentally sustainable designs for floodplain terracing and scour protection features, as well as establishment of habitat mitigation for Alternative 2 would minimize the effect the action alternatives would have on vegetation and wildlife and minimize this project's contribution to cumulative effects on vegetation and wildlife. Current ecosystem restoration projects in the Lower Truckee River reach have had a beneficial effect on vegetation and wildlife. The effects from either flood project alternative and the SouthEast Connector would contribute short-term significant adverse effects to vegetation and wildlife; however, revegetation of floodplain terraces for Alternative 3, and mitigation proposed for Alternative 2 and the SouthEast Connector would have a long-term beneficial effect on this resource. In addition, implementation of TROA would also contribute long-term beneficial effects to the overall condition of vegetation and wildlife. However, cumulative effects on this resource would be considered significant adverse because of the severity of degradation resulting from past projects such as diversions, dams, roadways, railroads, and past flood projects.

6.4.4 Fisheries

Over the past century, human alterations to the river and introduced fish species have contributed to the reduction in population of many native fish, leading to the extinction of the Pyramid Lake subspecies of LCT in the 1940s (Wheeler, 1987; USACE, 1995)[13] and the listing of cui-ui from Pyramid Lake as Federally endangered in 1967. Other native fish species, such as the tui chub and mountain whitefish, have experienced significant population declines over the past century (Otis Bay, 2004). Loss of fisheries habitat due to temperature elevation, construction of dams, pollution, and erosion continue to be a threat to the Truckee River system and to the entire region's fisheries (Washoe County, 2006).

Factors that influence temperature increases include water diversions and lack of riparian shading. Derby Dam, located approximately 42 miles upstream from Pyramid Lake, diverts much of the flow from the Truckee River into the Carson basin. The resulting flows downstream of Derby Dam are inadequate for cutthroat trout spawning (USFWS, 2003) and have dramatically lowered the level of Pyramid Lake. As a result, a silt delta has formed at the entrance to the lake, which prevents spawning migrations of the cui-ui and LCT (Galat, Lider, Vigg, and Robertson, 1981). Although spawning migrations do occur in years of above average flows, cui-ui and tui chub are mostly restricted to Pyramid Lake (Hughes and Whittier, 2005). Falling water levels at Pyramid Lake are also leading to salt buildups which can threaten some fish populations (Washoe County, 2006).

Riparian vegetation historically provided trout in the Truckee River with overhanging cover, a source of food organisms, bank stabilization (which helps keep the river low in suspended sediment), and a source of large woody debris. Perhaps more importantly, riparian vegetation served to shade the Truckee River and may have maintained water temperatures suitable to trout for longer distances downstream of Reno than presently occurs in the summer (USACE, 2001). Alterations to the river

[13] Different strains of LCT introduced into Pyramid Lake from Independence, Heenan, Summit, and Walker Lake in the 1950s (Coleman and Johnson, 1988) were listed as Federally threatened in 1970.

included straightening and widening for flood control, as well as for construction of I-80, the Southern Pacific Railroad, and the Truckee Canal. Connectivity to braided meanders and oxbow ponds was lost, and the riparian corridor, suddenly unable to reach the lowered water table, began to decline. The present-day combination of summer low flows and limited riparian shading make the Truckee River inhospitable to trout in the summer below the Vista Narrows area (USACE, 2001).

In addition, there are more than 30 potential fish passage obstacles on the Truckee River between Lake Tahoe and Pyramid Lake. Most of these obstacles are associated with water diversions for irrigation, power generation, and municipal uses. Impassable dams limit the amount of habitat available to fish in a riverine system (USACE, 2001). Also, most diversion structures on the Truckee River lack appropriate screening to keep fish species from becoming stranded within diversion canals when the water supplies recede and temperatures increase. The potential exists for the loss of a significant number of fish species when Truckee River diversions are operating.

Pollution in the form of dissolved solids and nutrient loads that enter the Truckee River from numerous sources such as agricultural land drainage, urban runoff, groundwater discharge, and treated wastewater effluent have also contributed to the degradation of the Truckee River fisheries habitat. The TMWRF is the major point source in the basin. Outflow from the TMWRF water reclamation facility contributes a significant amount of flow to the Truckee River when flows are at a low level. The effects of pollutants on fish life are most noticeable downstream from the outfall of TMWRF.

Agricultural activities are the primary non-point pollution source in the basin (Research Triangle Institute, 1994). High nitrogen and phosphorus loads, combined with the lack of a major flushing event, have caused aquatic plants to proliferate, resulting in abundant accumulations of benthic plants and detritus (Research Triangle Institute, 1994). Plant respiration and decaying biomass have decreased DO levels in the river. The low levels of DO have, in turn, impaired the river's ability to support populations of LCT and cui-ui (Research Triangle Institute, 1994).

The introduction of non-native fishes into the Truckee system has changed the species composition of fishes found in the river (Moyle, 2002). Truckee River invasives include Sacramento perch, green sunfish, largemouth bass, smallmouth bass, common carp, Sacramento blackfish, fathead minnow, black bullhead, white bass, yellow perch, western mosquitofish, brown trout, rainbow trout, and brook trout (Hughes and Whittier, 2005). Many of these introduced fish species out-compete native species, reducing their populations through predation, hybridization, and disruption of nutrient cycles.

Although recent actions such as ecosystem restoration projects by TNC, changes in water flow management through implementation of TROA, and improvements in fish passage at various dams and diversions such as Marble Bluff and Glendale have improved the fisheries condition, the Truckee River is still considered a degraded system facing continued challenges in supporting its native fisheries.

The Southeast Connector project could contribute short-term, construction related effects to native fisheries through temporary increases in turbidity and possible suspension of pollutents in Steamboat Creek that could travel to the Truckee River. According to RTC, due to concerns on their earlier designs of the Southeast Connector voiced by the PLPT, Phase 2 of the proposed roadway project would minimize the amount of disturbance to Steamboat Creek so as to avoid or reduce the potential of suspending contaminated sediments that could flow downstream and effect native fisheries in the Lower Truckee River reach. In addition, BMPs, proposed wetland mitigation, and long-term soil stabilization of disturbed areas would help minimize long-term effects to Truckee River fisheries as a result of the roadway project.

As discussed in Section 5.6 and Section 5.7, the proposed flood project alternatives would result

in temporary and permanent effects to fisheries, including those of Federally listed threatened and endangered fish, that could have an incremental effect when added to other past, present, and reasonably foreseeable future actions within the Truckee River Basin.

Each of the proposed alternatives includes construction of in-channel features that could temporarily affect fisheries habitat. If occurring simultaneously with in-water activities associated with one or more of the present or reasonably foreseeable future projects described in Table 6-1, construction of these features could contribute to an adverse cumulative effect on fisheries habitat. The potential for an incremental contribution to adverse cumulative effects would be minimized through the use of BMPs. Similar measures would be required of related present and reasonably foreseeable future projects in the Truckee River Basin to comply with the Federal Clean Water Act, thus avoiding temporary cumulative effects.

Implementation of either proposed alternative would include construction of flood risk management features that could affect the native fishery by removing shaded riparian habitat, providing cover for predator fish, and altering geomorphic dynamics. Implementation of environmentally sustainable designs for floodplain terracing and scour protection features, as well as establishment of habitat mitigation in the case of Alternative 2, would minimize the effect the action alternatives would have on fisheries and minimize this project's contribution to cumulative effects on fisheries resources. Current ecosystem restoration projects in the Lower Truckee River reach have had a beneficial effect on fisheries, including special status species. The effects from the flood project alternatives and the SouthEast Connector would contribute short-term significant adverse effects to fisheries; however, revegetation of floodplain terraces for Alternative 3, and mitigation proposed for Alternative 2 and the SouthEast Connector would have a long-term beneficial effect on this resource. In addition, implementation of TROA would also contribute long-term beneficial effects to the overall condition of fisheries. However, cumulative effects on this resource would be considered significant adverse because of the severity of degradation resulting from past projects such as diversions, dams, roadways, railroads, and past flood projects.

6.4.5 Land Use

As discussed in Section 5.8, the proposed alternatives would result in temporary and permanent effects to land use that could have an incremental effect when added to other past, present, and reasonably foreseeable future actions within the Truckee River Basin.

Each of the proposed alternatives would result in the use of undeveloped and vacant areas for staging and temporary work easement. Previously disturbed areas that are not currently being utilized will be given preference as staging areas. Following construction, existing conditions would be restored and existing land uses would be continued. This temporary and localized effect would not be cumulative in nature.

Implementation of either proposed alternative would include construction of flood risk management features that would involve a permanent change from existing land uses. Conversion of agriculture land is discussed below. The localized effect of changes in land uses from existing business/commercial/industrial uses would not be cumulative in nature. All proposed land uses would be consistent with zoning ordinances, general plan land use designations, and other relevant local and regional planning programs, including applicable habitat conservation plans and natural community conservation plans. Past projects, such as dams for reservoir and flood storage, roadways, railroads, and residential/commercial development have fostered a land use transition from rural/agricultural to urban, particularly in the Truckee Meadows area. However, this transition has been guided by city and county land use plans and policies and these projects would not be considered a significant adverse effect on

existing land uses. As with the proposed flood project alternatives, past flood projects were developed to reduce damages to existing structures already located in the base floodplain, not to prevent flooding in undeveloped areas. Therefore, new development is not being supported by the current flood project alternatives or other past flood projects. The SouthEast Connector would connect existing roadways from north and south of the river, providing access to previously undeveloped sites. However, the designation of the UNR Farms area as a floodway by city and county plans constrains development in this area, and the proposed Butler Ranch development has already been incorporated into the City of Reno land use plan. Overall, cumulative effects to land use would be considered less than significant to existing land uses.

6.4.6 Agriculture and Prime Farmlands

As discussed in Section 5.9 the proposed alternatives would result in temporary and permanent effects to agriculture and prime farmlands that could have an incremental effect when added to other past, present, and reasonably foreseeable future actions within the Truckee River Basin.

Staging and temporary work easements for construction of either proposed alternative would result in the temporary removal of agricultural land from production. One or more of the present or reasonably foreseeable future projects listed in Table 6-1 will likely involve similar short-term use of agricultural lands. Since these conversions would be temporary and not result in a permanent change in land use, the effect is not considered to be cumulative in nature.

Both the Southeast Connector project and proposed Southeast Truckee Meadows development projects, such as Butler Ranch, would convert some active agricultural land, both on the UNR Farms property and on the Butler Ranch property. However, a large portion of the active agricultural land on UNR Farms being crossed by the Southeast Connector would be spanned by the bridge currently being constructed for Phase 1 of the project. Therefore, the agricultural land being converted by the roadway project in the UNR Farms area would be a small segment south of Cleanwater Way. This would not seem to be an impediment for UNR Farms to carry out its current operations. The Butler Ranch property represents approximately 250 acres of agricultural land that would be converted. It is not clear if this would represent a significant loss of agricultural land regionally. Niether project would convert prime farmland or land of statewide importance.

Each of the proposed alternatives would also result in the permanent conversion of Prime Farmland and other cultivated areas. Alternative 3 project features would convert 66.5 acres of prime farmland into flood risk management and recreation uses. Alternative 2 would convert 63.7 acres of prime farmland. These conversions could contribute to a basin-wide loss of prime farmland associated with one or more of the past, present, and reasonably foreseeable future projects listed in Table 6-1. However, the Truckee Meadows basin contains 524 acres of irrigated prime farmland and much of the land converted by this project would remain open space, thus limiting the potential for future conversions to urban land uses. The cumulative effects of the flood project alternatives, the SouthEast Connector, and the Butler Ranch development on prime farmland and active agricultural land within the Truckee Meadows area could be considered locally significant.

6.4.7 Recreation

As discussed in Section 5.10 the proposed alternatives would result in temporary and permanent effects to recreational assets that could have an incremental effect when added to other past, present, and reasonably foreseeable future actions within the Truckee River Basin.

Construction of the proposed alternatives would result in temporary work easements and staging

areas that would reduce accessibility to some parks, open space areas, trails, and water-related recreation areas. Some trail segments would be subject to temporary closure during construction. Following completion of the alternatives, existing recreation features would be reestablished. Coordinated with local planning agencies, the effects would be phased throughout construction of the project. The temporary and localized effects would not be cumulative in nature.

Each of the proposed alternatives would involve the removal of vegetation from existing recreation areas. This localized effect would not be cumulative in nature. The establishment of a floodway for each alternative would involve designation of substantial acres of open space. This designation of open space would make a beneficial contribution to cumulative effects on recreational resources within the Truckee River Basin.

6.4.8 Aesthetic Resources

As discussed in Section 5.11 the proposed alternatives would result in temporary and permanent effects to aesthetic resources that could have an incremental effect when added to other past, present, and reasonably foreseeable future actions within specific areas of the Truckee River Basin

Construction of either proposed alternative would require ground-disturbance and staging activities that would affect local aesthetics. Coordinated with local planning agencies, the effects would be phased throughout construction of the project. These temporary and localized effects could be cumulative in nature when combined with construction activities of other reasonably foreseeable projects. However, the only project currently anticipated to occur within the project area would be Phase 1 of the Southeast Connector. Construction of Phase 1 is in progress and is scheduled to be completed before construction on the flood project would begin. Therefore, temporary construction-related effects to aesthetic resources would not be cumulative in nature in the flood project area.

In the long term, the Southeast Connector bridge over the Truckee River would introduce a new linear feature that would also span over proposed levees on the north side of the river. However, the levees would be constructed along the edge of vacant land in this location with commercial and industrial businesses along Greg Street just to the north. Long term cumulative effects from both projects on the visual setting of this area would be less than significant.

Each proposed alternative would have direct, long-term effects on the aesthetic setting. Local viewsheds would be altered by the construction of floodwalls, levees, and scour protection features. Localized viewshed reductions and degradation of visual character could have a cumulative effect if one or more of the past, present, or reasonably foreseeable future projects listed in Table 6-1 had similar effects in the same immediate area. Design measures would be employed to reduce the contrast between engineered features and the natural environment, and new trails would facilitate viewing of previously inaccessible stretches of the Truckee River. Elsewhere, the environmentally sustainable design would enhance the scenic quality of some stretches of the river, offsetting any alternative-related viewshed losses and making a beneficial contribution to aesthetic enhancements associated with related present and reasonably foreseeable future projects in the Truckee Basin. Overall, cumulative effects to visual and aesthetic resources within the project area would be less than significant.

6.4.9 Transportation and Circulation

As discussed in Section 5.12 the proposed alternatives would result in temporary and permanent effects to transportation and circulation that could have an incremental effect when added to other past, present, and reasonably foreseeable future actions within specific areas of the Truckee River Basin.

Alternative 2 includes bridge modifications and both alternatives include other construction activities that would require temporary road closings and detours. Construction-related traffic would increase volumes on existing roadways throughout the Truckee River Basin. If alternative-related effects occur simultaneously with traffic disruptions and volume increases from one or more of the present or reasonably foreseeable future projects described in Table 6-1, there could be an adverse cumulative effect.

The only project in the project area with a high likelihood of construction to occur at the same time as the flood project would be the Southeast Connector. Phase 1 of the roadway project, which is the only portion in the immediate area of the Recommended Plan flood risk management features, would be complete (scheduled for completion in 2014) before any construction on the Recommended Plan would begin. Phase 2 of the roadway project is scheduled to begin in 2014. A potential overlap of construction schedule for both projects would occur in 2015 and 2016. However, the roadway project is expected to progress southward, away from the flood project alternatives, and construction related traffic for the roadway is anticipated to shift with it. In the long-term, transportation and circulation for the region would be expected to improve with the addition of a new expressway.

A traffic affects analysis was conducted to identify which intersections and roadway segments would be affected by traffic reroutes and increased volumes. The traffic affects analysis considered all existing and forecast traffic volumes within the area to be affected by construction of the proposed alternatives. The modeling analysis identified project phasing, reroute options, and other Transportation Demand Management measures that would meet locally acceptable levels of service. All road closures and detours from the proposed alternatives and any simultaneous actions from present and future projects will be coordinated with local transportation and public works agencies to avoid adverse cumulative effects. Cumulative, short-term construction related effects attributed to the projects occurring simultaneously would therefore be considered less than significant. The flood project alternatives are not expected to have long-term effects on transportation and circulation.

6.4.10 Air Quality

As discussed in Section 5.13 the proposed alternatives would result in temporary and permanent effects to air quality that could have an incremental effect when added to other past, present, and reasonably foreseeable future actions within specific areas of the Truckee River Basin.

Each of the proposed alternatives would result in temporary increases in CO, VOC, NOx, and PM_{10} emissions. Emission contributions are inherently cumulative and must be considered in light of regional air quality standards. With the exception of the portion of Washoe County located within Hydrographic Area 87—Truckee Meadows, the cumulative effect area is in attainment for all criteria pollutants. Hydrographic Area 87—Truckee Meadows is designated as a “serious” non-attainment area for the 24-hour PM_{10}. An air quality effects analysis determined that PM_{10} emissions associated with the proposed alternatives are below Federal *de minimis* thresholds and do not constitute a regionally significant contribution. Cumulative effects of PM_{10} emissions from the proposed alternatives and related present and reasonably foreseeable future projects would be further reduced through compliance with Washoe County District Regulation 040.030 for the control of fugitive dust. Cumulative, short-term effects to air quality in Hydrographic Area 87 are expected to be less than significant with implementation of dust abatement measures. The flood project alternatives is not expected to have long-term effects on air quality.

6.4.11 Noise and Vibration

As discussed in Section 5.14 the proposed alternatives would result in temporary noise and vibration effects that could have an incremental effect when added to other past, present, and reasonably

foreseeable future actions in the vicinity of alternative-related construction activities.

The only project in the project area with a high likelihood of construction to occur at the same time as the flood project would be the Southeast Connector. Phase 1 of the roadway project, which is the only portion in the immediate area of the flood project alternatives, would be complete (scheduled for completion in 2014) before any construction on the flood project alternatives would begin. Phase 2 of the roadway project is scheduled to begin in 2014. A potential overlap of construction schedule for both projects would occur in 2015 and 2016. However, the roadway project is expected to progress southward, away from the flood project alternatives, and construction related noise for the roadway is anticipated to shift with it.

Construction of each proposed alternative would temporarily increase local noise and vibration levels. Construction activities associated with one or more of the present or reasonably foreseeable future projects listed in Table 6-1 would have similar noise and vibration effects. Each jurisdiction covering the areas of construction for the proposed alternatives has a noise ordinance that exempts daytime construction and demolition activities. A noise effects analysis was conducted to identify sensitive receptors and to compare alternative-related noise to ambient conditions. The results of this analysis will be used to develop a Noise Control Plan to minimize alternative-related noise levels and the potential for cumulative effects. Cumulative, short-term effects to noise and vibration in the project area are expected to be less than significant with implementation of noise abatement measures. The flood project alternatives is not expected to have long-term effects on noise and vibration.

6.4.12 Socioeconomics

As discussed in Section 5.15 the proposed alternatives would result in temporary and permanent socioeconomic effects that could have an incremental effect when added to other past, present, and reasonably foreseeable future actions within the Truckee River Basin.

Construction of the proposed alternatives would create a substantial temporary increase in employment opportunities and foster direct and induced regional spending. Construction activities associated with one or more of the present and reasonably foreseeable future projects listed in Table 6-1 would generate similar economic activity. The cumulative effect would be beneficial.

Implementation of the proposed alternatives would require modification or demolition of several structures (commercial and residential). One or more of the related present and reasonably foreseeable future projects such as the SouthEast Connector and Butler Ranch development might also require structural modification/demolition and population relocation. The small number of property removals and resident relocations for the various projects are not anticipated to take place at the same time. Under the proposed alternatives all removed properties would be purchased at fair market value and standard relocation assistance would be provided in compliance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

Overall, the present and reasonably foreseeable future projects are not expected to induce substantial population growth, displace substantial numbers of existing people or housing, substantially reduce employment opportunities or income levels in the area, or substantially affect public service providers. Cumulative effects to socioeconomic conditions in the region are expected to be less than significant.

6.4.13 Public Health and Safety

As discussed in Section 5.16, the proposed alternatives would result in temporary and permanent

public health and safety effects that could have an incremental effect when added to other present and reasonably foreseeable future actions within downtown Reno and the vicinity of the Reno-Tahoe Airport.

Implementation of the proposed alternatives would result in temporary road closures and permanent changes to circulation patterns that could hinder emergency response times in the Truckee Meadows area. These issues are addressed in the discussion of cumulative transportation and circulation effects.

Construction of levees and floodwalls along the river corridor for both flood project alternatives would represent localized long-term significant adverse effect to law enforcement services. Levee and floodwall heights would obstruct the view of the water side of the setback levee or floodwall from law enforcement personnel patrolling the river corridor. Although coordination of project design with law enforcement agencies would help to reduce this effect, it would still be considered locally significant. However, this would be considered a less than significant incremental effect to regional law enforcement services.

Potential residential developments in the Southeast Truckee Meadows area would increase demands on regional emergency services. However, local planning ordinances would require funding and development of additional resources to ensure established service thresholds are maintained. Therefore, cumulative effects on emergency services would be less than significant.

Implementation of the proposed alternatives would also increase health and safety risks as a result of construction activities in the vicinity of active railroad lines. An encroachment permit would be obtained from UPRR and all activities requiring encroachment onto the railroad right-of-way would be coordinated with UPRR. This would be a localized and isolated effect that would not have an incremental effect.

Implementation of the proposed alternatives would result in the construction of levees just beyond the Runway Safety Area of the Reno-Tahoe airport. Moreover, the revegetation of riparian areas may attract waterfowl across flight paths. Similar encroachments and habitat enhancements from past, present, and reasonably foreseeable future projects described in Table 6-1 could have an adverse cumulative effect. To minimize the potential for adverse cumulative effects, low-profile levees would be constructed in the vicinity of the airport and mitigation measures would be implemented to reduce the potential for wildlife hazards to aviation. Overall, cumulative effects to regional public health and safety would be considered less than significant.

6.4.14 Cultural Resources

Implementation of any of the alternatives, in conjunction with the projects listed above, could have cumulative adverse effects on significant historic resources along the Truckee River corridor. In the Truckee Meadows reach, for Alternative 2 the removal of the Jones Ranch would also have an adverse effect on the visual setting and historic landscape. The ranch has not been evaluated for National Register eligibility, but will likely be found eligible for listing. The 1865 dairy barn would be demolished, and the 1859 creamery building would be moved to another location. Since the Jones Ranch is set back considerably from Clean Water Way, however, the effects would be considered less than significant. Relocation of the historic Pioneer Ditch would be adverse, but not significant.

In addition to the flood project alternatives, other present and reasonably foreseeable projects such as the Southeast Connector and developments in the Southeast Truckee Meadows would have the potential to disturb previously unidentified archeological or cultural resources. As with the flood project alternatives, other projects are expected to have carried out field surveys, records and literature searches,

and consulted with the SHPO, Tribes, and historical societies having knowledge of the area to reduce the potential for unanticipated discoveries. Cultural resource monitors would also be employed during excavation activities in areas with high potential of containing unanticipated discoveries. Cumulatively, effects to cultural resources is expected to be less than significant.

6.4.15 Indian Trust Assets

As discussed in Section 5.19, implementation of the proposed alternatives would have effects on Indian trust assets in the project area. The potential for adverse cumulative effects would be consistent with the preceding discussions organized by resource. The effects on Indian Trust Assets from the flood project alternatives would represent a minor contribution to cumulative effects and would not significantly change the existing condition of these resources. However, cumulative effects on vegetation, wildlife, and fisheries assets would be considered significant adverse because of the severity of degradation resulting from past projects such as diversions, dams, roadways, railroads, and past flood projects. In accordance with Executive Order 13751, Consultation and Coordination with Indian Tribal Governments, USACE will continue consultations with Tribes regarding potential effects to trust assets throughout the remainder of the planning, design, and construction of the Recommended Plan.

CHAPTER 7. OTHER ENVIRONMENTAL CONSIDERATIONS

7.1 UNAVOIDABLE SIGNIFICANT EFFECTS

The CEQ's NEPA Compliance Guide states that any significant adverse environmental effects which cannot be avoided if the project is implemented must be described. This description includes significant adverse effects which can be mitigated, but not reduced to a level of insignificance.

The environmental effects of the project alternatives on environmental resources are discussed in Chapter 5 and Chapter 6. The analysis indicates that one or more of the project alternatives would result in significant adverse effects on geomorphology, water quality, vegetation and wildlife, special status species, recreation, aesthetic resources, traffic and circulation, socioeconomics, public health and safety, cultural resources, and Indian Trust assets. Most of these significant adverse effects can be reduced to a level of insignificance by implementing appropriate mitigation measures. However, some adverse effects on the following resources cannot be reduced to less-than-significant even when mitigation measures are implemented:

- Aesthetic Resources (visual obstruction created by levees and floodwalls).
- Public Health and Safety (floodwalls block views of law enforcement patrols).

7.2 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

In accordance with NEPA, this section discusses the relationship between local short-term uses of the human environment and maintenance of long-term productivity for the project. Construction of the Floodplain Terrace Plan and the Detention Plan would involve short-term uses of vegetation and wildlife, air quality, and traffic. The alternatives would narrow the range of beneficial uses of these resources during construction.

However, adverse effects on these resources would be limited to the construction phase of the project. No short-term uses of the environment are expected after the project is placed in operation. The air quality would return to pre-project levels after construction is completed. In the long term, planting to compensate the habitat types would offset the loss of vegetation and ensure the long-term productivity of the Truckee River reaches.

In addition, the long-term productivity of the environment would be increased by improving public safety due to stronger flood control measures and reducing flood damage.

7.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

In accordance with NEPA, this EIS discusses any irreversible and irretrievable commitment of resources that would be involved in the Floodplain Terrace Plan and the Detention Plan . Significant irreversible environmental changes are defined as uses of nonrenewable resources during the initial and continued phases of the alternatives that may be irreversible due to the large commitment of these resources.

The alternatives would result in the irretrievable commitment of lands. The lands needed to construct the various flood control measures would experience a change in land use. The new floodwalls would be compatible with the other flood control related uses of the surrounding area. In addition, they would result in the irretrievable commitment of construction materials, fossil fuels, and other energy resources needed to construct the Truckee Meadows Flood Control Project.

The proposed project would result in the irretrievable commitment of materials and fossil fuels during the construction phase of the project. Operation and maintenance is not expected to increase the use of construction materials or fossil fuels.

7.4 FISH AND WILDLIFE COORDINATION ACT RECOMMENDATIONS

The USFWS prepared the draft CAR using a preferred alternative no longer being considered by the USACE because additional analysis subsequently determined that the previous alternative did not meet Federal economic criteria. The USACE and local sponsor have since developed a new feasible preferred alternative focusing on flood risk management and recreation features in the Truckee Meadows project area. Ecosystem restoration and fish passage features included as part of the previous alternative are no longer included in the new Recommended Plan. As a result, some of USFWS's recommendations in the draft CAR no longer apply and would not be implemented as part of the project. The USFWS finalized the CAR on December 16, 2013 through issuance of a letter (included in Appendix B) acknowledging the differences in the Recommended Plan and emphasizing the recommendations in the CAR that would still apply to the Recommended Plan.

The USFWS's recommendations are provided below as they appear on pages 84 to 91 in the draft CAR. After each subset of recommendations (i.e., General Recommendations, Specific Recommendations, Flood Risk Management, Ecosystem Restoration, and Recommendations for Federally Listed Fishes), the USACE identifies those recommendations that have been implemented into all action alternatives. Reasons why the remaining alternatives were not implemented are also provided.

"9.0 RECOMMENDATIONS

"9.1 GENERAL RECOMMENDATIONS

"The recommendations provided herein for the protection of fish and wildlife resources are in accordance with the Service's Mitigation Policy (46 FR 15; January 23, 1981). Recommendations are based on the current project information provided by the Corps. These recommendations are to assist the Corps during the project's planning process to ensure that adverse impacts to existing wildlife resources are avoided or minimized. The following are our recommendations for enhancement of habitat associated with the Project:

1. The alternative with the most beneficial effects to riparian, aquatic, and wetland habitats and which avoids unmitigable impacts in the Truckee River should be selected. As evidenced by results from the Service's analysis, the most beneficial configuration is Alternative 4, the Locally Preferred Plan.

2. The LCT TRIT has finalized a Short-Term Action Plan (Action Plan) for the species (Service 2003). This Action Plan identifies priority areas with current or potential opportunities to support LCT or important habitats that would sustain various life history stages. It also specifies tasks to be implemented to help ensure long-term persistence of the species. All aspects of the Project should be reviewed for consistency with this Action Plan.

3. Consideration should be given to the implementation of TROA and the ecosystem-based sixflow regime recommendations and how this would affect restoration efforts.

4. In the absence of TROA implementation, design project features should be designed such that flow regimes match the prescribed ecosystem flow."

RESPONSE TO GENERAL RECOMMENDATIONS: The USACE has implemented all of these general recommendations to the extent possible with the rescoped alternatives being considered. For recommendation #1, Alternative 4-Locally Preferred Plan (referred to as the locally developed plan in sections 3.4 and 3.5 of the EIS), was not considered further following rescoping of the project in 2012. However, USACE believes that the Recommended Plan is the alternative plan with the most beneficial effects to riparian, aquatic, and wetland habitats due to the environmentally sustainable design features to be implemented. For recommendation #2, the Action Plan was reviewed during planning of alternatives and avoidance and minimization measures have been implemented to maintain consistency with the Action Plan. For recommendation #3, ecosystem restoration is no longer a project purpose; however, implementation of TROA was considered a future without project condition for the environmental effects analysis. For recommendation #4, features of the Recommended Plan would not effect function the prescribed ecosystem flow currently being implemented by USFWS and the PLPT.

"9.2 SPECIFIC RECOMMENDATIONS

1. Construction activities immediately in and adjacent to the river channel should be done during low flows (*i.e.*, between July 1 and September 30) while maintaining downstream water flow. De-watering associated with construction should not occur during the spring season to avoid migration periods of native fish (especially federally listed fish species). Personnel and equipment should be on-hand to conduct fish rescues if needed, placing fish outside areas of construction. Fish salvage operations would be coordinated with the Service and NDOW at least 24 hours prior to implementation.

2. Work activities outside the river channel should also be scheduled to minimize adverse impacts to wildlife resources. Construction should occur after nesting and rearing of young birds have been completed. To ensure impacts to nests or young do not occur, surveys should be conducted prior to construction to determine whether any birds are nesting in the area.

3. Implement BMPs for minimizing the spread of noxious weeds.

4. In areas dominated by the invasive, non-native species tall-whitetop, all plant materials removed during construction should be left on-site in a location that would not allow plant material to enter waterways. To avoid spreading weeds, all machinery and vehicles that leave the site should be washed on site to remove attached seeds and roots.

5. If hay/straw bales are used for sediment control, they should be certified weed-free to reduce establishment/reestablishment of invasive weeds.

6. Avoid impacts to woody vegetation at and adjacent to the construction staging areas. In the event any woody vegetation is inadvertently destroyed in the staging areas, it should be replaced on-site at a ratio of 5:1 (*i.e.*, five plants replaced for each one destroyed). Watering and monitoring of replanting success would be necessary until replanted areas are established.

7. Erosion control and maintenance measures should be implemented on a site-specific basis. Pertinent

materials should be certified weed-free. Hydromulch should be secured with an organic tackifier.

8. Minimize impacts to the grassland/herbaceous cover-type by reseeding all areas with native grasses and forbs, including construction staging and disposal areas.

9. Excess spoil materials should be properly stored. Measures should be implemented to ensure that spoil material does not enter the Truckee River, Steamboat Creek, or adjacent wetlands.

10. A spill prevention and containment countermeasure plan that addresses all potential mechanisms of contamination should be developed. Suitable containment materials should be on-hand in the event of a spill. All discarded material and any accidental spills should be removed and disposed of at approved sites.

11. An onsite, specified contractor certified in the federally approved Occupational Safety and Health Administration (OSHA) under 29 CDF, and the Resource Conservation and Recovery Act (RCRA) Guidelines under 40 CFR, should observe excavated materials at all times during excavation and grading of sites which may contain hazardous waste. Observation practices should serve to ensure that in the event hazardous waste is unexpectedly encountered, it is recognized as hazardous waste and handled properly. If additional contaminants are encountered during construction, the Corps should notify the non-Federal sponsors immediately and construction should be halted.

12. Minimize instream time and the number of stream crossings for heavy equipment. Stream crossings should be perpendicular to the stream and in designated areas using gently sloping and stable banks.

13. Equipment and vehicles operated within the floodway shall be checked and maintained daily to prevent leaks of fuels, lubricants, and other fluids to the river.

14. Temporary roads should be constructed to the minimal number, width, and total length consistent with construction activities. Minimize roads in sensitive areas (*e.g.*, riparian). Water bars and other erosional controls should be installed for permanent roads or trails.

15. Assemble a technical advisory team, composed of a qualified fishery biologist, riparian ecologist, and geomorphologist to provide technical oversight during construction for restoration. Team members should be available to inspect work onsite.

16. For any and all Federal lands allocated or designated primarily for fish and wildlife management associated with the project, develop General Plans (GPs) jointly with the Service and NDOW in accordance with section 3 of the Coordination Act (Public Law 732, 79th Congress, approved August 14, 1966, 60 Stat. 1080). GPs are to be prepared for the purpose of designating the type of use as between the national migratory bird management program of the Department of the Interior and the wildlife programs of the State of Nevada and therein to define the lands and waters to be administered by each.

17. Continue coordination efforts with the Service, NDOW and the PLPT throughout the preconstruction engineering and design phase with emphasis on features directly affecting fish and wildlife resources.

18. Implement measures for monitoring and associated adaptive management to verify the performance of mitigation, construction BMPs, and other conservation features. Lessons learned from the earlier phases of construction should be applied to later phases.

19. Prior to construction, participate in meetings of the Truckee River Operating Forum dealing with

projected river flows and incorporate into construction plans."

RESPONSE TO SPECIFIC RECOMMENDATIONS: The USACE has implemented all of these specific recommendations except all or part of #11, 15, and 16 above. For #11, no recorded HTRW sites would be physically affected by the construction activities. In addition, results of the database search and site visit indicate that there is no apparent HTRW contamination not already documented that could affect any of the alternatives. However, if any evidence of potential HTRW is found during construction, all work would cease, and USACE and TRFMA would be notified for further evaluation of the potential contamination. For #15, the current alternatives do not include ecosystem restoration features. For #16, there are no Federal lands allocated or designed primarily for fish and wildlife management in the project area.

"9.2.1 FLOOD RISK MANAGEMENT

1. As a part of in-channel work, remove structures that impede fish passage (upstream and downstream) and sediment transport and replace with structures that correct these problems (see Appendix C). In addition, any modifications to structures that control diverted flows should be outfitted with gages to measure amount of flow. This should not be limited to within restoration segments as there are a number of other problematic areas as identified in the Short-Term Action Plan (TRIT 2003). Other stakeholders with an interest in this issue (*e.g.*, Water master, Service and Tribes) should be coordinated with prior to final design and construction.

2. Water diversions from the Truckee River may be a source of fish entrainment. Along major diversions, site preparation for fish screens is recommended as an efficiency measure for federal spending. Within the project area, Idlewild, Wingfield, Cochran Ditch, North Truckee Drain, and Sission Ditch, are potential entrainment sources. The intake structures for some of these ditches may be modified by the proposed project. Fish screens, or provisions to accept fish screens, should be installed at these diversions which are likely to have long-term use.

3. Minimize the use of hard structures such as floodwalls where possible as these require inchannel work and restrict river movement. If space permits, use set-back levees to allow establishment of a greenway. Naturalized features should also be emphasized that promote flood damage reduction while restoring riverine functions.

4. On-bank or setback floodwalls should be favored over in-channel floodwalls in the Truckee River as the latter requires extensive work in close contact with the water.

5. Maximize infiltration through bioretention techniques that consider soils and vegetation that are proficient in trapping stormwater pollutants and take advantage of microbial processes that help transform and trap pollutants. This will benefit the project by reducing stormwater volume and peak runoff rate, recharging groundwater which helps replenish wetlands, creeks and rivers, augmenting base flows in streams, and settling and filtering of pollutants as they move through the system's vegetation and surficial soils (Livingston 2000). Bioretention areas should also be configured to prevent groundwater contamination.

6. Establish an institutional framework that assures that all BMPs are: (1) properly designed, (2) reviewed and approved, (3) inspected during and after construction, and (4) operated and maintained.

7. Slackwater areas that are temporarily flooded (*e.g.*, detention basins) during high flow events should be designed to minimize fish entrainment and stranding. Water conveyance should be equipped with evasive devices (*e.g.*, screens) specific to adult-sized fish or smaller. Flooded areas where fish

entrainment is unavoidable should be designed with a rampdown rate no greater than 3 inches per hour to allow volitional escape of fish back to the river and associated tributaries. Access to these areas should be granted to biologists and enforcement personnel of the NDOW and, Service, and their representatives to facilitate monitoring of fish stranding, fish salvage operations, and minimize poaching.

8. Water surface relations should be developed between established USGS gage stations and detention basins that will allow biologists to monitor rampdown via the internet. Outlet structure detention basins should also consider the settling of fine sediments and infiltration and removal of various contaminants (*e.g.*, stormwater runoff) as a means of improving water quality.

9. For Steamboat Creek, avoid excavations with the historic floodplain to avoid mobilizing contaminants (*i.e.*, mercury, boron, and arsenic).

10. Excavation within the stream channel should be limited. If all the excavated material is not relocated to another portion of the project area, it should be completely removed from the floodplain so it does not reenter the river during the next high flow event. These materials should also be located on previously disturbed upland areas.

11. For levees/rip-rap, a slope of 3:1 or 4:1 should be constructed where space is available to provide better bank stability. Instead of rip-rap, consider the use of stream barbs and vortex weirs in appropriate sections of the channel to control stream flow direction."

RESPONSE TO FLOOD RISK MANAGEMENT RECOMMENDATIONS: The USACE has implemented all of these flood risk management recommendations except all or part of #1, 2, and 8 above. For #1, the known barriers to fish passage within the Truckee Meadows reach have been modified by others to allow for passage of fish. Fore example Glendale and Pioneer Ditch diversions have recently been modified to improve their performance as well as allow for passage of fish. For #2, fish screens have already been installed by others on the Glendale and Pioneer Ditch diversions within the Truckee Meadows reach. The alternatives being evaluated would not modify the existing intakes of these diversions. For #8, if detention basins are brought forward for detailed design, correlations between water surface elevations and USGS gage stations would be developed.

"9.2.2 ECOSYSTEM RESTORATION

"1. Implement all fish passage improvements identified in Alternative 4, Locally Preferred Plan, including:

a. fish bypass and screen at Fleisch Diversion;
b. Steamboat Diversion improvement;
c. fish bypass and screen at Verdi Diversion;
d. fish bypass and screen at Washoe/Highland Diversion;
e. fish ladder and efficiency testing at Chalk Bluff intake;
f. replacement of irrigation structure at S-S Ranch;
g. upstream fish passage improvement and screening at Fellnagle and Hermann Ditches; and
h. the retrofit of existing fishway and new bypass channel at Marble Bluff Dam as described in Appendix D.

2. Compensate for unavoidable impacts and loss of high value habitat as described in Alternative 4-Locally Preferred Plan, including:

Truckee Meadows Reach

a. restore natural streambank functions by removal of 2.04 acres of existingrip-rap and shape newly exposed banks;
b. connect 3.11 acres of existing riparian habitat and interplant 6.45 acres in existinghabitat;
c. restore function of created low and high bench with 79.96 acres and 79.27 acres,respectively, of planted vegetation (= 153.23 acres);
d. complete 8.64 acres of major geomorphic restoration;
e. complete 2.97 acres of minor geomorphic restoration;
f. remove 34.59 acres of non-native invasive plant species; and
g. plant 41.75 acres of new riparian forests.

3. Develop a detailed and comprehensive monitoring plan for ER to demonstrate level of success in meeting project objectives and include a biological component for fish and wildlife. The plan shall provide, but not be limited to, specific performance standards, monitoring methods and requirements, and contingency measures for habitat to be restored and managed. Conduct pre-project surveys for selected species which will facilitate a comparison of pre- and post construction activities to help demonstrate level of success. As part of surveys, include all federally listed species and species of concern that may occur in the project area.

4. Develop and implement a 20-year vegetation monitoring program as a part of the project. Monitoring the riparian restoration effort should focus on recording tree survival rates, the quantification of improved habitat values for wildlife (primarily bird species) by measuring percent tree and shrub cover, average height of overstory trees, canopy layering, and total woody riparian vegetation, and developing recommendations for alternative methods of riparian restoration should initial efforts fail.

5. Monitoring of revegetated sites should be conducted by a qualified restoration ecologist and in collaboration with our Service botanist. Monitoring should continue annually for a minimum of 5 growing seasons to allow the vegetation to establish. Remediation plans shall be prepared and implemented in the event of a planting failure. Results of monitoring should be detailed in reports to be issued at 5-year intervals. At least one of the reports should have recommendations for future restoration projects on systems like the Truckee River and include construction BMPs.

6. In cooperation with the local non-Federal sponsors, develop a maintenance plan and a remedial action plan for ER to address contingencies in the event of failure.

7. Update and implement the Comprehensive Wildlife Sensitive Weed Control Plan (Otis Bay Consulting 2006). Removal and control of noxious weeds will provide wildlife enhancement features for the project. Manual removal measures are recommended in sensitive areas near waterways and wetlands. If chemicals are used in these areas, a wick applicator and a water labeled formula of 2,4-D should be used for infested areas located within 30 ft of the Truckee River and associated wetlands. Chemical uses in other areas should be applied according to the manufacturer’s specifications by state-approved weed control experts.

8. Minimize impacts to the upland/agricultural cover-type by reseeding all disturbed uplands with native grasses and forbs, including construction and staging areas.

9. Coordinate with the PLPT on restoration projects in subreaches on the reservation, as there are currently efforts to restore Proctor and Pierson Diversion Dams (re-engineered to allow fish passage) and associated riparian habitats.

10. Maximize efforts to salvage trees and shrubs in the local area, transplanting to designated sites in accordance with the Restoration Plan.

11. Where opportunities exist, remove existing rip-rap and other hard materials and replace with bioengineered stabilization structures."

RESPONSE TO ECOSYSTEM RESTORATION RECOMMENDATIONS: The USACE has implemented ecosystems restoration recommendations #7 and #11. All other recommendations have not been implemented because the current alternatives do not include ecosystem restoration or fish passage features as part of the proposed work.

"9.3 RECOMMENDATIONS FOR FEDERALLY LISTED FISHES

"The Service anticipates that the TMFCP will require formal consultation pursuant to section 7 of the ESA, and that this consultation will be programmatic in nature. Once a preferred alternative is selected and design for project features are finalized, the Corps should request initiation of section 7 consultation with the Service. To assist the Corps in satisfying their ESA obligations, we offer the following recommendations that should be addressed in any materials accompanying a request to initiate consultation. Until a final alternative is selected, these recommendations are preliminary and are provided for planning purposes.

1. As described above, the Corps should implement Ecosystem Restoration components, as described in Section 9.2.2 (above).

2. The Corps should implement the least environmentally damaging alternative for the proposed project to minimize adverse effects to federally listed species, specifically cui-ui and LCT.

3. The Corps should design detention basins to capture fine sediments and contaminants before entering the Truckee River (*i.e.*, infiltration component). Using a permanent semi-wetland vegetation zone in the capture area whenever appropriate and to provide additional wildlife habitat.

4. Where opportunities exist, construct a defined low-flow river channel with the appropriate configuration (*i.e.*, depths and widths) in support of fish passage, habitat, and water quality but which also retains the river's connectivity with the floodplain.

5. Where applicable, the Corps and local non-Federal project sponsors should use biotechnical bank stabilization methods on an aggressive, adaptive management basis. Experienced consultants and designers should be used to develop biotechnical designs on a location specific basis.

6. Place processed rock material within the riverbed to create a series of alternating pool and riffle complexes at various locations. The rock specifications would mimic the particle size distribution expected in a naturally functioning Truckee River. Excavation of channel meanders would reestablish the natural dynamic equilibrium of the river channel by reconstructing the channel into a meandering stream that generally follows the historic course of the channel, and could include sandbars and gravel bars. The river channel should also have a defined low-flow channel.

7. Coordinate with the Service, NDOW and the PLPT to incorporate access sites for purposes of stocking and monitoring fish populations in the Truckee River.

8. To enhance salmonid habitat, clean gravels and woody debris should be strategically placed in portions of the river shown to be lacking adequate levels of these components."

RESPONSE TO FEDERALLY LISTED SPECIES RECOMMENDATIONS: The USACE has implemented all of these recommendations for Federally listed fish species except all or part of #1, 3, 4, 6 and 8 above. For #1, as described under the ecosystem restoration recommendations, most ecosystem restoration recommendations were not implemented because the current alternatives do not include ecosystem restoration or fish passage features as part of the proposed work. However, a weed control plan will be implemented during revegetation activities following construction of flood risk managmenet features. In addition, rip-rap will be replaced to the extent practicable by bioengineered bank stabilization techniques during construction of project features. For #3, the Recommended Plan does not include detention basin features. For #6 and 8, the current alternatives do not include ecosystem restoration or fish passage features as part of the proposed work.

CHAPTER 8. COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS

8.1 FEDERAL LAWS

8.1.1 Clean Air Act, as amended, P.L. 91-604; 42 U.S.C. 1857h-7, *et seq.*

Full Compliance. The major Federal regulatory agency is the USEPA, which is responsible for establishing national ambient air quality standards, as well as developing and approving the implementation of plans developed by the states. The Washoe County Air Quality Management District is responsible for developing local district air quality management plans, establishing truck and automotive regulations, and enforcing rules and regulations pertaining to stationary and some mobile sources of air emissions. As discussed in Section 5.13 Air Quality, this project would not exceed national air quality standards based on modeled estimates of emission rates during construction of the project.

On November 30, 1993, USEPA promulgated final general conformity regulations at 40 C.F.R. Part 93 Subpart B for all Federal activities except those covered under transportation conformity. The general conformity regulations apply to a proposed Federal action in a non-attainment or maintenance area if the total of direct and indirect emissions of the relevant criteria pollutants and precursor pollutants caused by the proposed action equal or exceed certain *de minimis* amounts, thus requiring the Federal agency to make a determination of general conformity. As discussed in Section 5.13 Air Quality, the area is serious non-attainment for PM_{10}, and maintenance for CO and O_3. No project alternatives would exceed *de minimis* thresholds based on modeled estimates of emission rates during construction of the project.

8.1.2 Clean Water Act; 33 U.S.C. 1251 et seq.

Full Compliance. Although USACE does not issue permits for their own projects, USACE would comply with the guidelines and substantive requirements of Section 404, including Section 404(b)(1), and Section 401. The project would require discharge of fill material into Waters of the U.S. A section 404(b)(1) analysis was conducted on the Recommended Plan and is included in Appendix C. The discharge of fill material would comply with 404(b)(1) guidelines with the inclusion of appropriate measures to minimize pollution or adverse effects on the aquatic ecosystem. A Section 401 water quality certification will be requested from the Nevada Department of Environmental Protection.

The project would also require an NPDES permit since it would disturb 1 or more acre of land and involve possible storm water discharges to surface waters. Prior to construction, the contractor would prepare a Storm Water Pollution Prevention Plan and then submit a Notice of Intent form to the Bureau of Water Pollution Control, requesting approval of the proposed work. This storm water plan would identify best management practices to be used to avoid or minimize any adverse effects of construction on surface waters. Once the work is completed, the contractor would submit a Notice of Termination in order to terminate coverage by the NPDES permit.

8.1.3 Endangered Species Act of 1973, as amended, P.L. 93-205; 16 U.S.C. 1531, *et seq.*

Full Compliance. The Endangered Species Act, Section 7, prohibits Federal agencies from authorizing, funding, or carrying out activities that are likely to jeopardize the continued existence of a listed species or destroy or adversely modify its critical habitat. By consulting with USFWS before initiating projects, agencies review their actions to determine if these could adversely affect listed species or their habitat. Through consultation, USFWS works with other Federal agencies to help design their

programs and projects to conserve listed and proposed species. Because a number of listed species either occur on Federal lands or are potentially affected by Federal activities, USFWS coordination with other Federal agencies is important to species conservation and may help prevent the need to list candidate species. The USFWS is the administering agency for this authority regarding non-marine species.

The USACE initiated formal consultation unde Section 7 of the ESA on September 11, 2013. The USACE's determination (based on the biological assessment) was that Alternative 3-Floodplain Terrace Plan is likely to adversely affect the endangered cui-ui (*Chasmistes cujus*) and threatened Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) fish species and have no affect on the endangered Carson wandering skipper (*Pseudocopaeodes eunus obscurus*) butterfly species. Project activities are not expected to affect the candidate yellow-billed cuckoo (*Coccyzus americanus*) and greater sage grouse (*Centrocercus urophasianus*) bird species.

Following review of the information in this EIS, the biological assessment, and information from other agencies and sources, the USFWS provided the USACE with a biological opinion and incidental take statement on December 4, 2013 (included in Appendix E). The USACE will implement all reasonable and prudent measures and terms and conditions in the biological opinion to comply with Endangered Species Act requirements.

8.1.4 Bald Eagle Act; 16 U.S.C. 668.

Full Compliance. The Bald Eagle Act prohibits possessing, selling, transporting, or trading of a bald or golden eagle or eagle part, alive or dead. Violators are subject to criminal or civil penalties. The Secretary of the Interior can issue a permit for taking, possession, and transporting of bald and golden eagles for scientific, exhibition, and religious purposes, and may permit the taking of golden eagle nests if they interfere with resource development or recovery operations.

USACE would monitor for bald and golden eagles during construction; however, all work would be done outside the nesting period for bald or golden eagles. As a result, any nests of these species would not be harmed or moved.

8.1.5 Fallon Paiute Shoshone Indian Tribes Water Rights Settlement Act of 1990, P.L. 101-618; 104 Stat 3289 (1990).

Full Compliance. In 1990, Congress enacted the Fallon Paiute Shoshone Indian Tribes Water Rights Settlement Act of 1990 to provide for the settlement of water rights claims of the Fallon Paiute Shoshone Indian Tribes and for other purposes. Fallon Pauite Shoshone Indian Tribes Water Rights Settlement Act, Pub. L. 101-618, 104 Stat. 3289 (1990). That legislation directed USACE as follows:

The Secretary of the Army, in consultation with and with the assistance of the Pyramid Lake Tribe, State of Nevada, Environmental Protection Agency, the Secretary [of Interior], and other interested parties, is authorized and directed to incorporate into its ongoing reconnaissance level study of the Truckee River, a study of the rehabilitation of the lower Truckee River to and including the river terminus delta at Pyramid Lake, for the benefit of the Pyramid Lake fishery. Such study shall analyze, among other relevant factors, the feasibility of:

- Restoring riparian habitat and vegetative cover
- Stabilizing the course of the Truckee River to minimize erosion
- Improving spawning and migratory habitat for the cui-ui
- Improving spawning and migratory habitat for the Lahontan cutthroat trout

- Improving or replacing existing facilities, or creating new facilities, to enable the efficient passage of cui-ui and Lahontan cutthroat trout through or around the delta at the mouth of the Truckee River, and to upstream reaches above Derby Dam, to obtain access to upstream spawning habitat. § 207, 104 Stat. at 3312-13.

The Lower Truckee River Nevada Reconnaissance Report was completed in July 1995 by USACE Sacramento District. The report recommended specific restoration actions and implementation of an overall management plan for the lower river; however, complications in determining the cost-sharing capabilities of the PLPT for design and implementation of the proposed actions stalled progress. The GRR further evaluates the feasibility of habitat restoration along the Lower Truckee River.

8.1.6 Farmland Protection Policy Act, P.L. 97-98; 7 U.S.C. 4201, *et seq*.

Full Compliance. The Farmland Protection Policy Act requires a Federal agency to consider the effects of its actions and programs on the Nation's farmland. Federal agencies must coordinate with the NRCS to determine the extent of potential effects to farmland. In compliance with this requirement, USACE received a Farmland Conversion Impact evaluation from the NRCS on April 22, 2013.

Completion of the impact rating form by USACE produced a total point score of 145. The threshold for further action under the Farmland Protection Policy Act is 160 points or higher; therefore no further action is required for the Recommended Plan.

8.1.7 Federal Water Project Recreation Act, as amended, P.L. 89-72; 16 U.S.C. 460-1(12), *et seq*.

Full Compliance. The Federal Water Project Recreation Act requires that in planning any Federal navigation, flood control, or multipurpose project, full consideration be given to the opportunities afforded by the project for outdoor recreation, and fish and wildlife enhancement. All with-project alternatives include recreation components.

8.1.8 Fish and Wildlife Coordination Act of 1958, as amended, P.L. 85-624; 16 U.S.C. 661, *et seq.*

Partial Compliance. The Fish and Wildlife Coordination Act requires Federal agencies to coordinate with USFWS and State wildlife agencies during the planning of new projects or for modifications of existing projects so that wildlife conservation receives equal consideration with other features of such projects throughout the decision making process. Wildlife resources are conserved by minimizing adverse effects, compensating for wildlife resources losses, and enhancing wildlife resource values.

The USFWS prepared the draft CAR using a preferred alternative no longer being considered by the USACE because additional analysis subsequently determined that the previous alternative did not meet Federal economic criteria. The USACE and local sponsor have since developed a new feasible preferred alternative focusing on flood risk management and recreation features in the Truckee Meadows project area. Ecosystem restoration and fish passage features included as part of the previous alternative are no longer included in the new Recommended Plan. As a result, some of USFWS's recommendations in the draft CAR no longer apply and would not be implemented as part of the project. The USFWS finalized the CAR on December 16, 2013 through issuance of a letter (included in Appendix B) acknowledging the differences in the Recommended Plan and emphasizing the recommendations in the CAR that would still apply to the Recommended Plan.

8.1.9 Migratory Bird Treaty Act of 1918; 16 U.S.C. §§ 703-712.

Full Compliance. The Migratory Bird Treaty Act implements the convention for the protection of migratory birds between the United States and Great Britain/Canada, Mexico, Japan, and Russia. The statute makes it unlawful without a waiver to pursue, hunt, take, capture, kill or sell birds listed therein ("migratory birds").

Avoidance and minimization measures, particularly scheduling construction outside of migration windows and conducting pre-construction nesting surveys, would be implemented to avoid effects to migratory birds and maintain compliance with the Migratory Bird Treaty Act.

8.1.10 National Environmental Policy Act of 1969, as amended, P.L. 91-190; 42 U.S.C. 4321, *et seq.*

Partial Compliance. The National Environmental Policy Act applies to all Federal agencies and most of the activities they manage, regulate, or fund that affect the environment. This act requires full disclosure of the environmental effects, alternatives, potential mitigation, and environmental compliance procedures of proposed actions. The NEPA requires the preparation of an environmental document to ensure that Federal agencies accomplish the law's purposes. This EIS is in partial compliance with NEPA. Full compliance will be achieved when the final EIS and Record of Decision are filed with the USEPA.

8.1.11 National Historic Preservation Act of 1966, as amended, P.L. 89-655; 16 U.S.C. 470a, *et seq.*

Full Compliance. The National Historic Preservation Act, Section 106, requires Federal agencies to consider the effects of a proposed undertaking on properties that have been determined to be eligible for, or included in, the National Register of Historic Places. Additionally, federal agencies must give the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on the undertaking. However, in a letter dated March 25, 2005, the ACHP declined to participate in consultation.

The Section 106 review process consists of four steps: (1) identification and evaluation of historic properties; (2) assessments of the effects of the undertaking on historic properties (3) consultation with the SHPO and appropriate agencies to develop a plan to address the treatment of historic properties; and, (4) concurrence from the State Historic Preservation Officer regarding the agreement or results of consultation. However, as a principle course of action, the Federal agency should seek ways to avoid or minimize adverse effects.

USACE and the Nevada SHPO signed and executed a PA for the proposed action (undertaking) on August 23, 2005, and amended the PA on March 29, 2010. Concurring parties also signing the PA included the Cities of Reno and Sparks, and Washoe County. Since substantive public comments on the PA were not received during review of the EIS, no revisions were needed to the PA. The final PA is included in Appendix F of this final EIS. Any proposed changes to the Recommended Plan that may require additional environmental effects analysis may also require additional consultation under Section 106 of this act.

8.1.12 American Indian Religious Freedom Act; 42 U.S.C.§ 1996.

Full Compliance. The American Indian Religious Freedom Act states that the policy of the U.S. is to protect and preserve inherent rights of freedom of American Indians, Eskimo, Aleut, and native Hawaiians to believe, express, and exercise traditional religions. These rights include, but are not limited to, access to sites, use, and possession of sacred objects, and the freedom to worship through ceremony and traditional rites.

The proposed action does not limit, or otherwise adversely affect, access of the PLPT members or these other groups to fully believe, express, or exercise their traditional beliefs.

8.1.13 Resource Conservation and Recovery Act of 1976, P.L. 94-580; 7 U.S.C. 1010, *et seq.*

Full Compliance. The RCRA gave USEPA the authority to regulate hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. The RCRA also set forth a framework for the management of non-hazardous wastes. The 1986 amendments to RCRA enabled USEPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. The RCRA focuses only on active and future facilities, and does not address abandoned or historical sites. The 1984 Federal Hazardous and Solid Waste Amendments to RCRA required phasing out land disposal of hazardous waste. Some of the other mandates of this strict law include increased enforcement authority for USEPA, more stringent hazardous waste management standards, and a comprehensive underground storage tank program.

A Phase I Site Assessment of the project area was conducted by USACE, including a database search of recorded spills and a windshield survey of the area, and no previously undiscovered/unreported hazardous materials areas or spills were observed. The contractor will be required to develop a spill prevention, containment, and countermeasures plan prior to initiation of construction.

8.1.14 Rivers and Harbors Act of 1899; 33 U.S.C. 403, *et seq.*

Full Compliance. The Rivers and Harbors Act of 1899, Section 10, prohibits the unauthorized obstruction or alteration of any navigable water of the U.S. This section provides that the construction of any structure in or over any navigable water of the U.S., or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters is unlawful unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army. The Secretary's approval authority has since been delegated to the Chief of Engineers.

Similar to a Section 404 permit, if Congress authorizes the Truckee Meadows Flood Control Project, and USACE implements the project, a Section 10 permit would not be required because USACE would be the project proponent and USACE does not issue Section 10 permits for USACE projects.

8.1.15 Toxic Substances Control Act, P.L. 94-469; 15 U.S.C. 2601, *et seq.*

Full Compliance. This Act, as last amended in 1986, is the Federal legislation which deals with the control of toxic substances. State and local regulations should be consulted when engaging in PCB, Asbestos, Radon, or Lead-Based Paint activities on Civil Works projects or properties. Relocation or removal of several buildings within the project alignment may be required. If these buildings are found to contain toxic substances the non-Federal cost-sharing partner would be responsible for the removal and disposal of the material according to all applicable state and local regulations.

8.1.16 Uniform Relocation Assistance and Real Property Acquisition Policies Act

Full Compliance. Federal, state, local government agencies, and others receiving Federal financial assistance for public programs and projects that require the acquisition of real property must comply with the policies and provisions set forth in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended in 1987 (42 USC 4601 et seq.) (Uniform Act), and implementing regulation, 49 C.F.R. Part 24. Relocation advisory services, moving costs reimbursement, replacement housing, and reimbursement for related expenses and rights of appeal are provided for in the Uniform Act.

While all or portions of parcels within the alternative's footprints may need to be acquired to construct certain bank protection measures, it is not anticipated that the project would require construction of new housing. However, if necessary, property acquisition and relocation services, compensation for living expenses for temporarily relocated residents, and negotiations regarding any compensation for temporary loss of business would be accomplished in accordance with the Uniform Act.

8.1.17 Wild and Scenic Rivers Act, as amended, P.L. 90-542; 16 U.S.C. 1271, *et seq.*

Full Compliance. The National Wild and Scenic Rivers Act of 1968 was enacted to preserve selected rivers or sections of rivers in their free-flowing condition in order to protect the quality of river waters and to fulfill other national conservation purposes. The Truckee River has not been delegated as a Wild and Scenic River.

8.1.18 Water Resources Development Act of 2007, Section 2036(a).

Full Compliance. Section 2036(a) seeks to ensure that any report submitted to Congress for authorization, shall no select a project alternative unless such report contains (1) a specific recommendation with a specific plan to mitigate fish and wildlife losses or (2) the Secretary determines that the project will have negligible adverse effects. The Recommended Plan would have negligible effects to fish and wildlife through avoidance and minimization measures and construction of environmentally sustainable design features as presented in sections 5.5 through 5.7 of the EIS.

8.2 EXECUTIVE ORDERS

8.2.1 Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, November 6, 2000.

Full Compliance. Fundamental Principles. In formulating or implementing policies that have tribal implications, agencies shall be guided by the following fundamental principles:

(a) The U.S. has a unique legal relationship with Indian tribal governments as set forth in the Constitution of the U.S., treaties, statutes, Executive Orders, and court decisions. Since the formation of the Union, the U.S. has recognized Indian tribes as domestic dependent nations under its protection. The Federal Government has enacted numerous statutes and promulgated numerous regulations that establish and define a trust relationship with Indian tribes.

(b) Our Nation, under the law of the U.S., in accordance with treaties, statutes, Executive Orders, and judicial decisions, has recognized the right of Indian tribes to self-government. As domestic dependent nations, Indian tribes exercise inherent sovereign powers over their members and territory. The U.S. continues to work with Indian tribes on a government-to-government basis to address issues concerning Indian tribal self-government, tribal trust resources, and Indian tribal treaty and other rights.

(c) The U.S. recognizes the right of Indian tribes to self-government and supports tribal sovereignty and self-determination.

USACE has initiated Formal Government to Government Consultation with the Pyramid Lake Paiute Tribe. Consultation is ongoing and will continue throughout the planning, design, and construction of the project.

8.2.2 Executive Order 13112, Invasive Species, February 3, 1999.

Full Compliance. The objective of this Executive Order is to prevent the introduction of invasive species and provide for their control and to minimize their economic, ecological, and human health effects that invasive species cause.

Invasive species, particularly noxious weed species, are pervasive throughout the project area. Prior to construction, the construction contractor will be required to prepare and implement an invasive species control plan approved by USACE and acceptable to appropriate resource agencies, such as the USFWS, NDOW, and NRCS.

8.2.3 Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994.

Full Compliance. This Executive Order states that Federal agencies are responsible to conduct their programs, policies, and activities that substantially affect human health and the environment in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination under such programs, policies, and activities because of their race, color, or national origin. As discussed in Section 5.16 Environmental Justice, project alternatives would not have a disproportionate effect on minority or low-income populations in the project area.

8.2.4 Executive Order, 11988, Floodplain Management, May 24, 1977.

Full Compliance. The objective of this Executive Order is the avoidance, to the extent possible, of long- and short-term adverse effects associated with the occupancy and modification of the base flood plain (1% annual event) and the avoidance of direct and indirect support of development in the base flood plain wherever there is a practicable alternative. Reductions in the base (FEMA's 100-year) floodplain as a result of this project occur only in areas that are currently developed, and existing local ordinances strictly regulate further development in the base floodplain. Therefore, this project would not directly or indirectly support development in the floodplain.

8.2.5 Executive Order, 11990, Protection of Wetlands, May 24, 1977.

Full Compliance. This executive order directs Federal agencies, in carrying out their responsibilities, to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. As discussed in Section 5.6, Vegetation and Wildlife, reasonable effort will be taken in the detailed design of the project to avoid disturbance to existing wetlands and implementation of environmentally sustainable designs. Any destruction, loss, or degradation of wetlands would be compensated through creation of new wetland habitat.

CHAPTER 9. PUBLIC INVOLVEMENT AND INTERAGENCY COORDINATION

9.1 SCOPING PROCESS AND PUBLIC INVOLVEMENT

The public and concerned planning and resource agencies have been invited to participate in all phases of the Truckee Meadows Flood Control Project since the initiation of the General Reevaluation Study in 1996. This included opportunities to comment on the 1997 Reconnaissance Report, the Notice of Intent, the Public Scoping Meeting conducted in 1999, and public workshops in 2000, 2003 and 2005. Additional efforts were made to solicit public input and feedback on the Truckee Meadows Flood Control Project planning efforts, including:

- Disseminating information through a project web site - www.truckeeflood.us
- Creating and publishing a monthly newsletter on progress of the project
- Creating opportunities for comment and discussion through public meetings and workshops at which USACE, local proponents, and other involved agencies have actively participated

A Public Scoping Meeting was held in 1999 to provide background information, discuss the purpose of the study, and discuss conceptual alternatives used in flood protection projects. Concerns identified during public scoping typically fell into four categories: flood protection, schedule, recreation, and environment.

Public concerns about flood protection included various issues, such as the reduction of existing and potential flood damage to private and public properties and facilities, potential high maintenance costs for a flood control project, the length of time required to complete the project, noise impacts on adjacent landowners during construction, and removing properties from the “100-year” floodplain. All pertinent scoping concerns have been duly considered in the preparation of this document.

Environmental issues include public concerns about the biological effects of the project including effects on vegetation, wildlife, and fish. Tribal concerns were raised concerning induced flood impacts, barriers to fish passage, and environmental impacts.

USACE held several meetings with stakeholders of the Truckee River downstream of Vista. Informational meetings were held in early 2002, 2004, 2005, 2007, 2010 and 2011 with representatives for the Pyramid Paiute Tribe, and residents of Rainbow Bend and Painted Rock.

In November 2003 a meeting was held in Rainbow Bend to update residents and other interested parties on project progress. Preliminary without project floodplains were presented, along with ecosystem restoration conceptual alternatives and a detailed description of the study process. Once the with-project floodplains were completed, another meeting was held in October 2004 at Rainbow Bend. This meeting was a workshop to solicit public input on potential solutions for both induced flooding impacts and effects of flooding from Long Valley Creek. A follow-up session was held in December to brief interested parties on the progress of the economic evaluation of potential damages at Rainbow Bend. Subsequent meetings between residents and TRFMA resulted in a proposed solution for induced flooding impacts that was included in the alternatives array for evaluation.

Informational meetings were held with members of the Pyramid Lake Paiute Tribe throughout the study. USACE has also attended several tribal meetings to brief the tribal council on study progress.

Tribal members were also included in an inter-agency resource group that considered fish passage solutions on the Truckee River. Tribal concerns over water quality and induced flooding impacts were taken into consideration during the study.

A project website was established in coordination with the local proponents at www.truckeeflood.us. The website has grown steadily since its establishment and now serves as a prime portal for project information to the local community. USACE originally developed and distributed a project newsletter and project website, eventually deferring to TRFMA for its current distribution.

9.1.1 Local And Regional Interests

Throughout the General Reevaluation Study, USACE and local proponents have coordinated planning activities with other Federal, State, and local regulatory and planning agencies. USACE and local proponents have engaged these agencies throughout the development and refinement of a range of alternatives that would meet the flood risk reduction, recreational, and environmental objectives of the project. The primary conduit for technical feedback from other agencies and environmental groups included USACE' interagency meetings and public outreach meetings, with members representing the following organizations:

- U.S. Army Corps of Engineers
- Truckee River Flood Project
- City of Reno
- City of Sparks
- Washoe County
- Storey County
- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency
- Pyramid Lake Paiute Tribe
- Nevada Department of Transportation
- Federal Highways Administration
- Federal Aviation Administration

USACE had invited the Federal Highway Administration (FHWA) to be a NEPA cooperating agency on this project because of potential jurisdictional considerations regarding the replacement of bridges in the Downtown Reno reach; however, once the Downtown Reno reach features were dropped from consideration, FHWA's jurisdictional ties to the project were substantially reduced and their interest and participation diminished. USACE did not invite other agencies to participate as cooperating agencies because of the limited jurisdiction or need for special expertise of other agencies regarding project issues and decisions. However, USACE has actively coordinated with the USFWS as required by the Fish and Wildlife Coordination Act throughout the study process and coordinated with the USBOR and BLM on a consistent basis, particularly in regard to previous ecosystem restoration plans in the Lower Truckee River reach that are no longer proposed in the Recommended Plan. In addition, USACE has entered into Government to Government consultation with the Pyramid Lake Paiute Tribe and the Reno-Sparks Indian Colony, as well as informally coordinating with the tribes on a regular basis throughout the course of the study. The U.S. Bureau of Indian Affairs has been engaged in efforts to address Indian Trust

responsibilities and to request assistance in furthering Government to Government consultations with the tribes.

9.1.2 Community Coalition Process

A community-based planning process was initiated by the local project sponsors (now TRFMA) in response to the high level of expressed interest in public involvement in finding the most acceptable solution to the regional flooding problem. The Truckee Meadows Community Coalition was formed in 2000, and the local sponsors agreed to work with the Coalition in developing a preliminary alternative that would have broad community support and would be included in USACE' general re-evaluation study. A facilitated community-based planning process began, and a diverse array of community members representing environmental, business, and neighborhood groups spent many hours establishing their goals and design objectives.

The Coalition pursued a preliminary alternative that would protect property from the 1% annual chance event while minimizing or eliminating floodwalls in existing residential neighborhoods, and providing open floodplain area adjacent to the river for floodplain management, ecosystem restoration, and parkway purposes. Some of the Coalition members formed the Working Group and Hydrologic and Hydraulic (H&H) Modeling Group to assist in developing the Coalition preliminary alternative. The Truckee River hydrology was reevaluated and received concurrence from the H&H Modeling Group as well as USACE.

In March 2002, the Community Coalition provided their alternative for USACE to consider in the general re-evaluation study. The alternative provided flood protection in downtown Reno with the Landmark Bridges alternative described in Chapter 3, flood protection combined with ecosystem restoration in the Truckee Meadows, and ecosystem restoration downstream.

A successor to the Community Coalition was the Truckee River Flood Project Working Group, consisting of members of the Community Coalition process who desired to remain involved in the process. They meet regularly with TRFMA and provide input into the local planning efforts.

9.1.3 Flood Project Coordinating Committee

The Flood Project Coordinating Committee (FPCC) was formed in April 2005 consisting of representatives from Washoe County, City of Reno, City of Sparks and University of Nevada, Reno. This group was formed under a cooperative agreement to establish a local voice in the implementation of the project. More than a dozen non-voting members from the public are also members of the FPCC. This committee met on a monthly basis to conduct business related to the local efforts to support the project. USACE participated in these meetings, providing project briefings and answering inquires from the committee.

The FPCC coordinated numerous public outreach meetings, seminars and public events during the study, as well as directed their technical staff regarding interaction with the PDT. The FPCC operated between 2005 and 2011.

9.1.4 7.2.3 Truckee River Flood Management Authority

In early 2009 the Cities of Reno and Sparks and Washoe County determined that a cooperative agreement between the governing bodies would be necessary to meet the responsibilities of a non-Federal sponsor. The Nevada Legislature passed SB 175 during the summer of 2009 authorizing cities and counties to collect fees for the purpose of a flood project. In August 2009 work began on a draft

cooperative agreement. All three governing bodies approved the cooperative agreement in January-February 2011 and the TRFMA held its first meeting in March 2011 and formally approved the Interlocal Cooperative Agreement.

9.1.5 Views of the Local Project Proponent

Since this GRR is being conducted at 100 percent Federal cost, USACE does not have a local cost-sharing sponsor under a cost-sharing agreement. A Memorandum of Agreement was reached with the TRFMA in 2012 that provided non-Federal funds for the completion of the GRR. Additionally, the TRFMA technical staff continues to interact with USACE on technical issues.

TRFMA is fully aware of its responsibility to furnish all project lands, easements, rights-of-way, and relocations. They are also aware of its responsibility to comply with the provisions of the NFIP. Washoe County voters approved a 1/8 cent sales tax to pay for their portions of the non-Federal cost-share prior to the initiation of the re-evaluation study. This funding is controlled by TRFMA. When it became clear that this would be insufficient to fund the non-Federal share of the project, a joint powers authority was created and additional funds will be raised through an assessment.

TRFMA has the objective of achieving flood risk reduction for the 1% annual chance event in downtown Reno and the Truckee Meadows areas and ecosystem restoration along the Truckee River downstream of Vista. Although the Recommended Plan does not meet this local objective, TRFMA supports the study efforts of the GRR, and they have provided a letter of intent to serve as the non-Federal sponsor for the project as it proceeds into Preconstruction Engineering and Design and construction phases.

9.1.6 Views of Concerned Resource Agencies

The USFWS's primary concern is the potential for induced flows to increase the risk of scour downstream of Vista along the river's bed and banks. Not only could increased scouring result in the loss of riverbank and aquatic habitats, it could would adversely affect the Federally listed Lahontan cutthroat trout and cui-ui. The USFWS has participated in local working groups and assisted in the development of possible plans for fish passage.

9.1.7 Views of Tribes

The Pyramid Lake Paiute Tribe's fundamental concern is induced flows from a project in the Truckee Meadows. Induced flows can increase sediment loading and degrade water quality, which can threaten aquatic habitat. The Tribe cultivates a successful Lahontan cutthroat trout fishery that provides income from sport fishing, so any negative effects from induced flows carry the potential to jeopardize an important part of the Tribe's livelihood. The Tribe is also concerned with the overall environmental effects of the project.

The PLPT is a proponent for fish passage improvements and has expressed concern that fish passage is not included in the Recommended Plan and concern that not enough coordination was conducted with the Tribe during the development of the Recommended Plan. The Corps has collaborated, coordinated and consulted with the Pyramid Lake Paiute Tribe on the Truckee Meadows Flood Control Project over the years. This communication was established prior to 2005. Government to Government consultation was initiated in 2005. Throughout the years, Corps staff identified, shared, and discussed potential effects and benefits for the array of alternatives under consideration and sought comments and views from the Pyramid Lake Paiute Tribe for consideration. After a brief pause on the project to review overall direction and scope/schedule, a TSP was established. As part of this pause, USACE, the Army, and TRFMA made a decision to remove the ecosystem restoration from the alternatives being considered.

After the project pause, Corps staff re-engaged consultation with the Pyramid Lake Paiute Tribe. In April and May 2013, consultation opportunities included supplying information on the TSP, reviewing technical data and modeling, providing feedback for consideration and presenting information to the tribal governance. Additional information on Government to Government consultation is provided in section 5.19 of the EIS.

The PLPT is also concerned about adverse impacts to their lands. The hydraulic modeling of this study has shown that, although there would be a slight increase in the stage of the 1% ACE event along the river, it would not be great enough to affect existing structures in the Lower Truckee River reach, including on Tribal lands.

The PLPT's comments and USACE responses are included in Appendix H to the EIS.

Another tribe in the study area is the Reno-Sparks Indian Colony (RSIC). The original RSIC land holding is adjacent to flood risk management features, and their stated concern was the flood risk reduction offered by the project. A Wal-Mart store was recently constructed on the RSIC land that included a floodwall along the proposed alignment of the flood project levee. This floodwall provides stand-alone flood risk reduction benefits for the RSIC property up to the 1/117 annual chance exceedence event. TRFMA contributed funding for construction of the floodwall and has requested consideration of credit for this contribution towards their non-Federal cost-share obligations.

Additionally, the RSIC is concerned with the overall environmental effects of the project on traditional and cultural resources along the Truckee River.

CHAPTER 10. LIST OF PREPARERS

Name	Qualifications	Participation
Daniel Artho	B.S., Biological Sciences, 1991 15 years experience	Senior Environmental Manager
Richard Perry	Archaeologist	Cultural Resources
Brian Luke	Wildlife Biology	Clean Water Act Section 404(b)(1) Analysis
Laurie Warner Herson	B.A., Anthropology, 1977 33 years experience	Environmental Sciences Lead
Linda Fisher	M.S., Environmental Management, 2009 B.S., Environmental and Resource Sciences, 2004 7 years experience	Environmental Team Coordination
W. D. Baldwin	B.S., Civil Engineering, 1992 Professional Engineer: Iowa, Oregon, Washington 17 years experience	Traffic and Circulation
Subrata Bandyopadhyay	MBA, Business Administration, 2006 Ph.D., Environmental Engineering, 1995 B.E., Civil Engineering, 1986 24 years experience	Water Quality
Eric Chase	B.S., Geology, 1974 Professional Geologist, California Certified Engineering Geologist, California Certified Hydrogeologist, California 36 years experience	Geomorphology
Robert Edgerton	M.S., Environmental Sciences/Studies, 1999 B.A., Natural Resources, 1990 LEED Accredited Professional, American Institute of Certified Planners 20 years experience	Traffic and Circulation
Michael Ernst	B.S., Chemical Engineering, 1998 Professional Engineer: Indiana 12 years experience	Air Quality
Mark Farman	B.S., Environmental Policy, 1982 29 years experience	Water Resources and Supply
Teresa Fung	B.A., Anthropology and Classical Civilization, 1990 M.A., City and Regional Planning, 1996 20 years experience	Agriculture and Prime Farmland Land Use
Dan Lahde	M.S., Hydrology, 2003 B.S., Environmental Sciences/Studies, 1996 14 years experience	Water Resources and Supply

Name	Qualifications	Participation
Nancy Nething	B.S., Geology, 1976 OSHA, U.S. National Registration; Certified Professional in Storm Water Quality; Certified Professional in Soil Erosion and Sediment Control; Registered Professional Geologist, California 34 years experience	Public Health and Safety
Devyn Richardson	M.S., Environmental Sciences/Studies, 2000 B.S., Environmental Sciences/Studies, 1997 13 years experience	Indian Trust Assets Recreation and Open Space
Smith Siromaskul	B.S., Civil Engineering, 1999 Professional Engineer, California 11 years experience	Traffic and Circulation
Rona Spellecacy	M.A., Public Affairs/Environmental, 2003 B.A., Biology, 1997 B.A., Anthropology, 1997 American Institute of Certified Planners 13 years experience	Water Quality
Jeanette Winter	B.S., Environmental Studies, 1999 Registered Environmental Assessor 11 years experience	Socioeconomics Aesthetic Resources Noise and Vibration

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